MARCH, 1909. Vol. LIII. No. 373.

JOURNAL

OF THE

Royal United Service Institution.

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL.

Editor - Captain H. Garbett, R.N. (Retired).

All communications (except those for perusal by the Editor only) to be addressed to the Secretary, Royal United Service Institution.

LONDON:

The Royal United Service Institution,
WHITEHALL, S.W.

Telegraphic Address: "RUSSATUS, LONDON."

Printed by J. J. KELIHER & CO., LIMITED, 33, King William Street, E.C.

Sole Advertisement Contractor: Mr. C. GILBERT-WOOD, Dacre House, Arundel Street, Strand, London, W.C.
Telegraphic Address: "GILBERWOOD, LONDON."

Price Two Shillings.

CONTENTS FOR MARCH, 1909.

ROYAL UNITED SERVICE INSTITUTION.

PRESIDENT.

Field-Marshal H.R.H. The DUKE OF CONNAUGHT, K.G.

VICE-PRESIDENTS.

Admiral *Rt. Hon. Sir* J. C. DALRYMPLE-HAY, Bart., G.C.B., D.C.L., F.R.S.
General *Sir* F. C. A. STEPHENSON, G.C.B., Constable of the Tower.
Field-Marshal the *Viscount* WOLSELEY, K.P., G.C.B., O.M., G.C.M.G. (1903)
Field-Marshal *Right Hon.* the *Earl* ROBERTS, V.C., K.G., K.P., G.C.B., O.M., G.C.S.I., G.C.I.E., V.D. (1905)
Vice-Admiral *H.S.H. Prince* Louis of BATTENBERG, G.C.B., G.C.V.O., K.C.M.G., A.D.C. (1906).
Colonel *Right Hon. Sir* J. H. A Macdonald, K.C.B., V.D. (1908).

CHAIRMAN.

Admiral of the Fleet the *Lord* WALTER KERR, G.C.B.

VICE-CHAIRMAN.

Lieut.-General H. D. HUTCHINSON, C.S.I.

MEMBERS OF THE COUNCIL.

Lieut.-General R. S. S. BADEN-POWELL, C.B., Commanding Northumbrian Division Territorial Force
Colonel J. H. BOR, C.M.G., R.M.A., A.D.C., Extra Equerry to H.R.H. The Prince of Wales.
Commander W. F. CABORNE, C.B., Royal Naval Reserve.
Vice-Admiral *Sir* C. CAMPBELL, K.C.M.G., C.B., D.S.O.
Colonel T. S. CAVE, V.D., Commanding South Midland Brigade, Territorial Force.
Colonel R. B. COLVIN, C.B., Essex Yeomanry.
Colonel C. G. DONALD, C.B., half pay, late Royal Fusiliers.
Rear-Admiral A. M. FIELD, F.R.S., Hydrographer of the Navy.
Major-General *Sir* T. FRASER, K.C.B., C.M.G.
Lieut.-Colonel *Honble.* T. F. FREMANTLE, V.D., The Buckinghamshire Battalion, The Oxfordshire Light Infantry.
Colonel LONSDALE A. HALE, late R.E.
Colonel J. A. L. HALDANE, C.B., D.S.O., A.D.M.O., War Office.
Colonel the *Viscount* HARDINGE, 6th Bn. the Rifle Brigade.
Colonel W. A. HILL, C.B., late 3rd Bn. The Gloucestershire Regiment.
Colonel W. C. HORSLEY, V.D., 28th Bn. The London Regiment
Colonel *Honble.* O. V. G. A. LUMLEY, Commanding 2nd South Midland Mounted Brigade, Territorial Force.
Lieutenant G. R. MALTBY, M.V.O., R.N. (retired).
Major-General *Sir* G. H. MARSHALL, K.C.B.
Colonel F. I. MAXSE, C.V.O., C.B., D.S.O., Commanding the Coldstream Guards and 3rd London Brigade, Territorial Force.
Admiral of the Fleet *Sir* G. H. U. NOEL, K.C.B., K.C.M.G.
Rear-Admiral R. J. W. SLADE, M.V.O.
Brigadier-General H. H. WILSON, C.B., D.S.O., Commandant of the Staff College.

Secretary and Curator.

Lieut.-Colonel A. LEETHAM, Royal Monmouthshire Royal Reserve Engineers, late 13th Hussars.

Editor.

Captain H. J. G. GARBETT, R.N. (retired).

Librarian.

Major C. H. WYLLY, late 1st Bn. South Staffordshire Regiment.

Assistant Secretary and Curator.

Captain B. E. SARGEAUNT, 12th Bn. The London Regiment.

Auditors.

Messrs. WILDE & FERGUSON DAVIE, Chartered Accountants, 61½, Fore Street, E.C.

The undermentioned can become members by intimating their wish to the Secretary, and either forwarding to him their subscription, or giving him a written authority on their bankers or agents for its payment:—Commissioned officers of the Royal Navy, Regular Army, Royal Marines, Militia, Indian and Colonial Naval and Military Forces, Imperial Yeomanry, Royal Naval Reserve, Volunteer Corps, and Cadet Battalions and Corps, as published in the Official Navy and Army Lists, together with retired officers of the same whose names are retained in the Navy or Army Lists, and Naval Cadets, and Cadets of the Royal Military Academy, Woolwich, Royal Military College, Sandhurst, and Royal Military College, Kingston, Canada, on the recommendation of their commanding officers.

Officers retired from the various Services enumerated above, whose names do not appear in the Navy or Army Lists, are eligible for election by ballot on the recommendation, on personal knowledge, of two members of the Institution.

The terms of subscription are:—

Annual. £1 1s 0d. entrance; and £1 1s. 0d. annual, payable on the 1st January each year.

Life. £15, payable in one sum.

Life. £15 15s., payable in three instalments of Five Guineas each; the first on joining the Institution, the others on the 1st January of each of the succeeding two years.

Members joining after the 1st October in any year are not called upon for any subscription the following year.

An extra payment of Ten Shillings entitles a member in the United Kingdom to the loan of Four Volumes at a time from the Library for a period of twelve months from the date of the subscription.

When a member desires to pay his subscription through his banker or agent, he should send to the Secretary a written authority as follows:—

To (*Banker or Agents*)

On receipt of this order please pay to Secretary, Royal United Service Institution, or order, my subscription to that Institution (according to the terms above).

Name in full.
Rank, Ship, or Regiment.

Address to which Journals and other communications should be sent.

The name of any member who fails to pay his annual subscription for two years is removed from the List of Members, but the member may be re-admitted as a new member on the usual terms.

Members of the United Service Institution of India on leave to the United Kingdom, and officers of the Colonial Naval and Military Forces who are temporarily in this country on duty, can become temporary members, and make use of the Institution on payment of Five Shillings per six months.

The Institution contains the best professional Library in the United Kingdom; an excellent collection of Maps and Charts; Reading and Smoking Rooms provided with the leading papers, periodicals, and writing materials; an interesting Museum; and a Theatre in which lectures upon professional subjects, followed by discussion, are frequently given.

The Journal, published monthly, is sent post free to all members. It contains the lectures given in the Theatre, articles on professional subjects, naval and military notes, book notices, &c.

NAVAL AND MILITARY BUSINESS DIRECTORY.

NAVAL AND MILITARY PUBLICATIONS.

NAVAL AND MILITARY HOTEL DIRECTORY.

NAVAL AND MILITARY SOCIETIES AND CHARITIES.

NAVAL AND MILITARY MUSEUMS, &c.

Mr. E. Carlisle, M.A. (Cantab.),

AND

Major M. H. Gregson, late R.E.

Prepare Candidates for all Army and Civil Service Examinations, at

5 & 7, LEXHAM GARDENS, KENSINGTON, W.

We have retained the services of all the Tutors who have been so remarkably successful in past years, and continue to receive both Resident and Non-Resident Candidates.

Recent Successes include:

STAFF COLLEGE, AUGUST, 1908.

The following Officers, whose names are arranged in regimental order, were successful from us at the recent Competitive Examination for admission to the Staff College

Capt. A. F. Home, 11th Hussars.
" J. Knowles, 15th Hussars.
" C. R. Newman, Royal Field Artillery.
" P. E. Lewis, Royal Field Artillery.
" M. H. C. Bird, Royal Garrison Artillery.
" C. G. Fuller, Royal Engineers.
" G. R. Frith, Royal Engineers.
" T. C. Mudie, Royal Scots.
" I. L. B. Vesey, Royal West Surrey Regiment.
" H. G. A. Thomson, Royal Warwickshire Regiment.
" E. T. Humphreys, Lancashire Fusiliers.
" D. S. Robertson, Royal Scots Fusiliers.
" H. L. Alexander, Dorsetshire Regiment.
Lieut. A. P. Wavell, Royal Highlanders.
Capt. H. C. Johnson, D.S.O., King's Royal Rifle Corps.
" R. M. Tyler, Durham Light Infantry.
Lieut. A. J. McCulloch, Highland Light Infantry.
Capt. L. C. Sprague, Royal Irish Rifles.
Capt. L. F. Renny, Royal Dublin Fusiliers.
Lieut. C. M. Davies, Rifle Brigade.
Capt. R. D. Barbor, Army Service Corps.
" C. L. Norman, M.V.O., Indian Army.
" G. L. Pepys, Indian Army.

The following obtained Nominations:

Major S. R. Kirby, 6th Dragoon Guards.
Capt. R. Hutchison, 11th Hussars.
" E. F. Calthrop, Royal Field Artillery.
" and Bt. Maj. A. J. Turner, Royal Field Artillery.
" and Bt. Maj. C. B. Thomson, Royal Engineers.
" and Bt. Maj. A. J. G Moir, Royal Scots.
" and Bt. Maj. A. McN. Dykes, Royal Lancaster Regiment.
" A. D. Green, D S.O., Worcestershire Regiment.
" T. H. C. Nunn, D.S.O., Royal West Kent Regiment.
" H. L. Knight, Royal Irish Fusiliers.

WOOLWICH.

November, 1908.

7th	C. E. R. POTTINGER	...	6,800
16th	A. T. H. HAYES	...	6,444
32nd	R. BLEWITT	...	6,166
43rd	F. W. B. WILSON	...	5,947

June, 1908.

Third	G. B. STALLARD	...	7,629
22nd	L. F. PAGE	...	6,564
23rd	G. E. W. FRANKLYN	...	6,559
29th	G. A. CAMMELL	...	6,437

SANDHURST.

November, 1908.

CAVALRY.

3rd	J. A. BATTEN-POOLL	...	4,464

INFANTRY.

7th	C. F. RYDER	...	5,300
31st	G. S. LEVENTHORPE	...	4,590
41st	N. W. THIELE	...	4,396
49th	J. G. HALSTED	...	4,254
68th	M. A. S. COUSINS	...	4,105
68th	A. E. MAITLAND	...	4,087
69th	D. K. S. GRANT	...	4,068
74th	W. A. BURGES	...	4,019

INDIAN POLICE (JUNE, 1907).

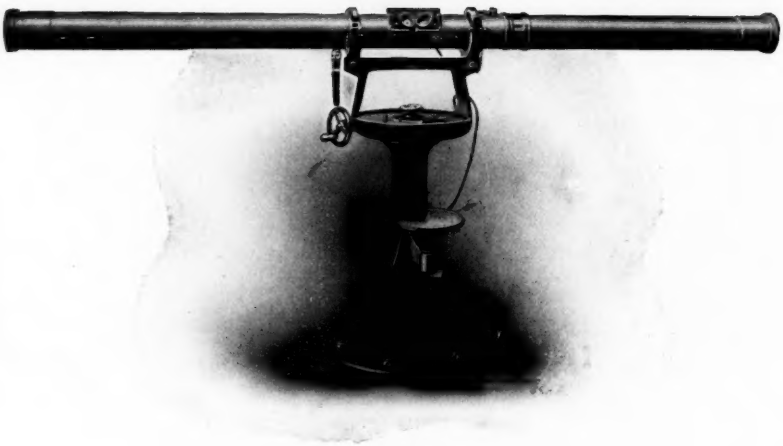
Third ... F. W. Toms ... ... 6,886 | 27th ... ... H. W. Waite 5,980

ARMY QUALIFYING (1908).

FIFTEEN WERE SUCCESSFUL FROM US.

COMPETITIVE EXAMINATION (1908).

Douglas Scott, Kent Artillery.
J. L. Longstaffe, 1st Lancashire R.F.R A.
D. G. Gunn, 3rd P.W.O. West Yorkshire Regt.
A. L. Cooper Key, 5th Middlesex Regiment.
W. C. Loder Symonds, Lancashire Fd. Artillery.
R. G. Atkinson, West Surrey Regiment.
R. W. Leach, Cambridge Volunteers.
A. Donaldson, Cambridge.
G. W. Courtney, Cork R.G.A.
N. L. H. Clarke, 3rd Bn. Lincolnshire Regt.

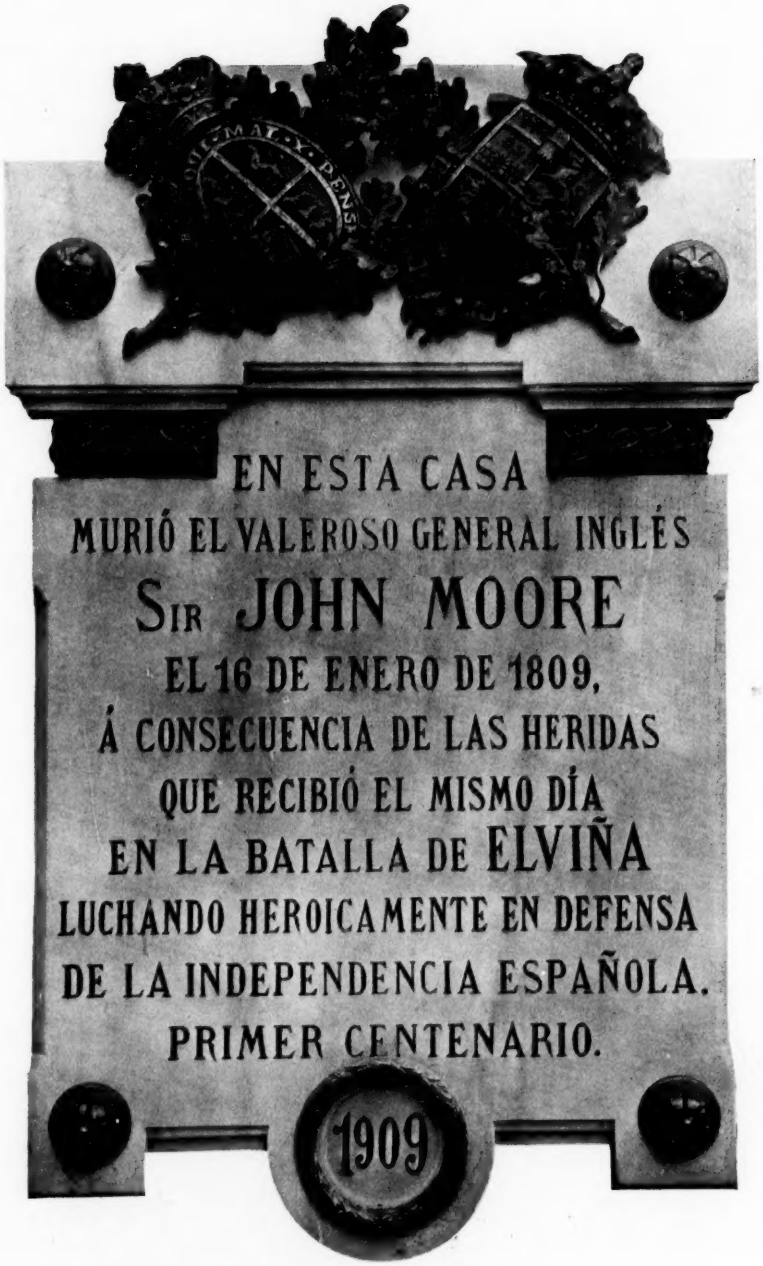


THE BARR AND STROUD FORTRESS RANGEFINDER.
9 FT. BASE.

Approximate uncertainty of observation:—
(Irrespective of the height of the instrument above sea level.)

1 yard	at 1,000	yards.
17 yards	at 4,000	,,
85 ,,	10,000	,,
190 ,,	15,000	,,

BARR AND STROUD,
ANNIESLAND,
GLASGOW.



MEMORIAL TABLET TO LIEUT-GENERAL SIR JOHN MOORE, K.B.,
which has been placed on the wall of the house, where he died, on the Centenary of his death.

From a photograph presented by H.B.M. Consul at Corunna.

THE JOURNAL

OF THE

ROYAL UNITED SERVICE INSTITUTION

VOL. LIII. MARCH, 1909. No. 378.

SECRETARY'S NOTES.

I. OFFICERS JOINED.

The following Officers joined the Institution during the month of February:—

Major E. V. D. Riddell, Royal Artillery.
Lieutenant R. G. Clarke, The Queen's Royal West Surrey Regiment.
Colonel E. G. T. Bainbridge, East Kent Regiment.
Major G. T. M. Bridges, D.S.O., 4th Dragoon Guards.
Major T. E. Scott, C.I.E., D.S.O., Indian Army.
Captain W. E. Clark, R.H.A.
Lieut.-Colonel A. Duncan, late Indian Medical Staff.
Colonel H. S. Massy, C.B., late Indian Army.
Second-Lieutenant J. F. Nugent, Indian Army.
Major T. T. Pitman, 11th Hussars.
Commander E. P. Statham, R.N. (retired).
Lieutenant C. E. Morgan, South Wales Borderers.
Lieutenant W. H. P. Richards, R.M.L.I.
Captain C. C. G. Ashton, East Surrey Regiment.
Lieutenant H. J. B. Hall, R.N.
Lieutenant G. Houlgrave, R.N.R.
W. W. Ashley, Esq., late Lieutenant Grenadier Guards.
Lieut.-Colonel V. S. Smyth, late Royal Warwickshire Regiment.
Second-Lieutenant T. G. Davson, 1st County of London Yeomanry.
Captain F. C. Winter, late Essex Regiment.
Second-Lieutenant L. P. Clay, Yorkshire Dragoons.
Second-Lieutenant A. W. G. Campbell, Coldstream Guards.

II. COUNCIL.

The following Officers were elected at the Anniversary Meeting to fill the vacant seats on the Council:—

Colonel L. A. Hale, late R.E.
Colonel Honble. O. V. G. A. Lumley, half-pay, late 11th Hussars.
Colonel C. G. Donald, C.B., half-pay, late Royal Fusiliers.
Colonel W. A. Hill, C.B., late 3rd Battalion The Gloucestershire Regiment.
Colonel R. B. Colvin, C.B., Essex Yeomanry.
Colonel the Lord Bingham, 5th Battalion The London Regiment.
Colonel T. S. Cave, Commanding South Midland Brigade, Territorial Force.
Commander W. F. Caborne, C.B., R.N.R.

III. GOLD MEDAL ESSAY.

The Council has awarded the Gold Medal of the Institution, together with the First Trench-Gascoigne Prize of thirty guineas, for the Naval Essay for 1908, to Major A. B. N. Churchill, Reserve of Officers, Royal Artillery. The Second Trench-Gascoigne Prize of twenty guineas has been given to Commander T. L. Shelford, R.N. The subject of the Essay was, "The Command of the Sea: What is it?" The Referees were: Admiral-of-the-Fleet Sir A. K. Wilson, V.C., G.C.B., G.C.V.O., Vice-Admiral Sir C. Campbell, K.C.M.G., C.B., D.S.O., and Rear-Admiral E. E. Bradford, C.V.O. The Essays of Captain R. F. Phillimore, M.V.O., R.N., and Lieutenant Thomas Fisher, R.N., were recommended for publication.

IV. LECTURES.

The Lecture which was to have been given by Major W. H. Greenly, D.S.O., on 3rd March, on "The Cavalry of Frederick the Great," has been postponed to Wednesday, 31st March, at 3 p.m., when General Sir J. D. P. French, G.C.V.O., K.C.B., K.C.M.G., Inspector-General of the Forces, will preside.

Admiral-of-the-Fleet Sir G. H. U. Noel, K.C.B., K.C.M.G., will preside at the Lecture on Wednesday, 17th March, by Commander H. W. Richmond, R.N., on "The Expedition to Sicily in 1718, under Sir George Byng."

V. LENDING LIBRARY.

The Lending Library is available for all Members of the Institution residing in the United Kingdom, the annual subscription for the loan of four volumes at a time being ten shillings.

VI. ADDITIONS TO THE MUSEUM.

(943) Three Paintings in Water-colour, by the late Sir J. A. Crow, depicting scenes in the Crimean War, and sketched for the *Illustrated London News.—Given by A. Crow, Esq.*

(946) Feather-Bonnet as worn by the Seaforth Highlanders.
—Given by Mrs. H. M. McChance.

(947) Helmet Plate, Royal Military College, Sandhurst.
—Given by Mrs. H. M. McChance.

(949) Helmet Plate of the 5th Battalion Rifle Brigade.
—Given by Colonel G. S. Maxwell.

(950) Ten Commissions, ranging from Ensign to Deputy-Adjutant-General, of Sir Adam Williamson, K.B., bearing the signatures, amongst others, of the Duke of Marlborough and W. J. Pitt. The commissions are dated from 1755 to 1778.
—Given by Richard Jones, Esq.

(951) Nine Commissions of George Williamson, R.A., ranging from Major to Lieut.-General, dated from 1747 to 1772, and signed, amongst others, by the Duke of Marlborough, the Marquis of Granby, and Lord Ligonier.
—Given by Richard Jones, Esq.

(952) Portrait in Oils of Lieut.-General Sir Charles Napier, G.C.B., painted by an Officer on his Staff, *circa* 1843.
—Given by Lieut.-Colonel Sir G. J. Campbell, Bart., late K.R.R.C.

(953) Plan of the Town and Fortifications of Gibraltar, dated 1738.

(993) Grenade for Busby of the 101st Royal Bengal Fusiliers, worn previous to 1881.
—Given by Museum Attendant T. Simpson, late Black Watch.

(994) Gurkha Kukri with engraved metal handle.
—Given by Lieut.-General H. D. Hutchinson, C.S.I.

(995) A curiously-painted Indian Shield, picked up by the donor on the Battlefield of Goojerat, 21st February, 1849.
—Given by Lieut.-Colonel W. Dickinson, C.S.I.

(3334) A small Gold Brooch, containing a lock of Lieut.-General Sir John Moore's hair, and inscribed "Corunna, 16th January, 1809."

(3335) Studded Leather Despatch Box of Lieut.-General Sir John Moore, K.B., used by him in the retreat to Corunna.

(3336) Light Infantry Sash of Lieut.-General Sir John Moore, K.B.

(3338) A Scimitar presented to Lieut.-General Sir John Moore, K.B. *Deposited by The Lord Seaton.*

Collection of Orders, Medals, etc., of the late Field-Marshal Lord Seaton, G.C.B., G.C.M.G., G.C.H. :—

(3337) Field-Marshal's Bâton.

(3339) Gold Collar and Badge of the Hanoverian Order of the Guelph.

(3340) Star Riband and Badge of the Hanoverian Order of the Guelph.

(3341) Star, Riband, and Badge of the Most Distinguished Order of Saint Michael and Saint George (G.C.M.G.).

(3342) Star, Riband, and Badge of the Most Honourable Order of the Bath (G.C.B.).

(3343) General Officer's Gold Cross for the Peninsula with three clasps.

(3344) Waterloo Medal.

(3345) Peninsula Medal with five clasps.

(3346) Field Officer's Gold Medal for the Peninsula with two clasps.
(3347) Star of the Order of Saint George of Russia.
(3348) Two Gold Badges of the Order of the Tower and Sword.
(3349) Cross of the Order of Maria Theresa of Austria.
—Deposited by The Lord Seaton.

(3350) A Collection of fifty-two Shoulder-belt Badges of Line and Militia Regiments.
—Deposited by Captain H. G. Parkyn, 5th Bn. the Rifle Brigade.

(3351) Damascened Kutti, contained in a green sheath, formerly the property of Colonel Obeidullah Khan, A.D.C., of Bhopal.
—Deposited by Major N. M. Smyth, V.C., The Carabineers.

VII. HISTORY OF THE XIIIth HUSSARS.

For the purposes of this Book, the Historical Record Committee of the regiment ask for information as to the existence of:—

1. Letters, papers, and diaries of those who have served in the 13th Hussars.
2. Portraits of distinguished officers, particularly that of Colonel Richard Munden, who raised the regiment in 1715.
3. Historical relics.

Such information would be most gratefully received by Mr. C. R. B. Barrett, care of Lieut.-Colonel A. Leetham, Royal United Service Institution, Whitehall, S.W.

THE BRUNSWICK REGIMENTS

By Colonel von KORTZFLEISCH, Commandant of the Military Camp, Posen.

THE following brief sketch of the two Brunswick Regiments, now known in the German Army as the 92nd Infantry and the 17th Hussars, which celebrate the centenary of their formation on the 1st April of this year, has been kindly forwarded to us for publication in the JOURNAL by Colonel von Kortzfleisch, Commandant of the Military Camp at Posen. As both Regiments fought with distinction under the British flag in the Peninsula, at Quartre Bras, and at Waterloo, Colonel von Kortzfleisch hopes that his brief sketch may be of interest to readers of the JOURNAL.

* * * * *

The two Brunswick Regiments which celebrate the hundredth anniversary of their formation on the 1st of April, fought for many a long and stirring year under the British flag. Therefore it is only just to review the eventful history of these two regiments, now known as the 92nd Infantry and the 17th Hussars.

The Guelfan Duke Frederic William, being outrageously debarred from succeeding to the Throne by Napoleon, raised a corps at Nachod, in Bohemia, on the 1st of April, 1809. This he clad in black, and to show his thirst for revenge, he gave it a skull as a badge. As the ally of Austria he fought bravely with his corps in Saxony and Bayreuth against the Saxons, Westphalians, Dutch, and French. With the battle of Wagram and the armistice of Znaym, his hopes of re-conquering his possessions were for some time shattered.

On the 24th of July, 1809, he declared his independence at Zwickau, and started on his famous march through North Germany. In twelve days he traversed 500 kilometres, stormed Halberstadt, and gained a victory over a Westphalian detachment at Brunswick. In spite of all dangers, his black corps safely reached the mouth of the Weser and embarked at Elsfleth and Brake. On the 8th of August nine English men-of-war escorted them from the Sathorne to Heligoland. This fleet was under the command of Lord George Stewart. Six days later the corps landed at Great Yarmouth and Grimsby. An order to proceed from Heligoland to the Isle of Walcheren to join the Chatham Corps did not reach the Duke in time.

The Brunswick troops were now in the British service, and quartered at Sandown and Freshwater, in the Isle of Wight. Out of the infantry twelve companies were at first formed; out of the Hussars, who up till then had no horses, six troops or three squadrons.

After being completely incorporated with the British Army, the Brunswick Corps was ordered to Guernsey, where the Duke himself made them swear allegiance to King George III. in November, 1809. In May of the following year the corps took up its quarters at Fermoy and Cork, in Ireland, where it remained until its departure for the Peninsula.

The Brunswick Rifle Regiment joined Lord Wellington's forces at Torres Vedras in October, 1810. Under Colonel v. Bernewitz it was transferred to the 7th Division on the latter being formed. In its commander, Lord Dalhousie, the regiment found a special patron. The Brunswickers were greatly praised by the British because of the steadiness with which in the battle of Fuentes d'Onor they repelled Montbrun's cavalry at Pozo Velho. After taking part in the sieges of Cuidad Rodrigo, and Badajoz, the regiment fought in 1812 around the Arapiles, near Salamanca, and was the first of the whole army to enter Madrid. Thereupon it took part in the terrible retreat from Burgos into Portugal, where it was especially roughly handled at the Bridge of Tordesillas. In 1813 the Brunswick Regiment helped Wellington to gain North Spain, crowned by the victory of Vittoria. The winter campaign in the Pyrenees, the passage of the Bidassoa, the battles of Nivelle and Niveline, but more especially the glorious days of Echalar and the storming of the Ste. Barbe Redoubt at Sare, brought the regiment many trials and triumphs. After the battle of Orthes, March, 1814, the regiment found itself in Bordeaux, under Marshal Lord Beresford. Here it awaited its recall to England. During the Peninsular war the regiment only consisted of nine companies, two having been transferred to the 5th and one to the 4th Division. It is due to this that the Brunswickers were also present at the glorious victories of Albuhera and San Sebastian. On the 25th of December, 1814, the regiment was attached to the infantry of a corps of all arms which had in the meantime been raised in Brunswick.

The Hussar regiment had first been mounted in Ireland. It did not consist of more than four troops when it left Cork in 1812. After crossing to Alicante it joined the corps operating against Suchet in Valencia and Catalonia. This corps was commanded successively by Generals Murray, Bentinck, and Clinton. The Hussars fought at Tarragona and Barcelona. Their red-letter day was on the 13th of September, 1813, however. Here, in this cavalry engagement, the dashing charges of Lieut.-Colonel Schrader at Villafranca saved Mackenzie's brigade from a serious reverse.

On the reinstalment of Spain's rightful King, Ferdinand VII., the British troops evacuated the Peninsula. In May, 1814, the Brunswick Hussars were ordered to Sicily. They stayed in Messina over a year, and spent another winter in Genoa. They were at last recalled home. On the 25th of July, 1816, the regiment having returned to Brunswick, quitted the British service.

In Brunswick, after the Westphalian invader had been expelled, a new force was raised in November, 1813. This was composed in 1815 of eight battalions of infantry, one squadron of Hussars, one of Lancers, and two batteries. The whole was placed at the disposal of the Duke of Wellington, who attached it to his reserves. On the 16th of June this corps covered itself with glory in foiling the attack of Foy's division and in frustrating the constant charges of Killermann's cavalry. At the head of his own battalion (formerly the Anglo-Brunswick Regiment), Duke Frederic William met a soldier's death in this battle; but his corps did not distinguish itself any the less two days after on the 18th of June, under Colonel Olfermann's command. It was in reserve at Mirbraine, and from there was sent to Goumont (wrongly called Hougomont) with two battalions to help repel the numerous charges of Ney's cavalry. Later on the Iron Duke sent it to support Alten's division, which, after the loss of La Haye Sainte, was threatened with annihilation. The Brunswick Hussars also did not lose the opportunity of sending many a charge home. We thus see that the Brunswick troops have been true and loyal comrades in arms to the English during the gravest but yet most glorious years of British military history. There is little doubt that on the hundredth anniversary of their formation even Great Britain will give them their due, and tender them her heartiest and best wishes.

The remaining history of the Brunswick Regiments can be summed up in a few words. In the long ensuing years of peace they underwent many changes. On Duke William coming to power in 1830, the infantry, whose oldest soldiers had fought in the Peninsula, was formed into two battalions and one independent battalion (The Duke's Own). The Hussars, on their return from Paris in 1815, had brought with them a squadron of the Anglo-Brunswick Hussar Regiment from the depôt in Ireland. These were now formed into a regiment of two and later on of three squadrons. Besides this there was also a battery. In 1848 the infantry and battery, and a year later two squadrons of Hussars, were ordered to Sundewitt. At Düppel they fought against the Danes. In 1866 Brunswick was allied to Prussia. The former's troops, however, did not march on Nurnberg before the decision of the war lay with Prussia. In October, 1867, we see the Brunswick troops as part of the North German Federal Army. From then to the present day they have been known as the 92nd Infantry and 17th Hussars.

In the war of 1870 the Brunswick Hussars greatly distinguished themselves on the 16th of August. At Flavigny they charged into the 2nd Battery of the Imperial Horse Artillery of the Guard. Here they nearly succeeded in capturing Marshal Bazaine, who only escaped with great difficulty. The 92nd Infantry took part in the siege of Metz. In the winter months of 1870 they had opportunity of adding to their laurels at Orléans,

Vendôme, and Le Mans. On the 16th of December, 1870, they distinguished themselves most brilliantly in capturing a battery of Jauréguiberry's artillery of the reserve to the north of Vendôme.

Since this great war the two Brunswick Regiments have enjoyed peace. On the 1st of April, 1886, they were attached to the Prussian Army, due to a military convention between Prussia and Prince Albert of Prussia, who at that time was Regent of Brunswick. Hereupon the infantry lost its black uniform with blue facings, as well as the shako with its black plume; but even now, after one hundred years, the skull on their headgear points to their Bohemian origin, while the Peninsula Shield reminds us of the glorious years when, as part of the British Army, they fought under the command of the illustrious Duke of Wellington.

THE CYCLE IN WARFARE: ITS POTENCY AS A STRATEGICAL AND TACTICAL FACTOR.

By Captain A. H. TRAPMANN, Adjutant, 25th (Cyclists) Battalion (County of London) The London Regiment.

On Wednesday, 16th December, 1908.

Brig.-General Sir H. S. RAWLINSON, Bart., C.V.O., C.B., *p.s.c.*, Commanding 2nd Infantry Brigade, Aldershot, in the Chair.

IT is some three years since a paper on the subject of Military Cycling was last read in this Hall, by Major R. A. Johnson, now Brigade-Major of the South Midland Brigade. That these three years have been fruitful in changes in the evolution of the cycle as an engine of war must be my excuse for inflicting upon the members of this Institution another lecture on the same subject. Those who are cyclist officers, or who have kept closely in touch with the progress of military cycling, will doubtless call to mind the changes to which I refer; but I do not think that it would be out of place to roughly outline in a few words the past history of military cycling, both at home and abroad, before I attempt to deal with the present or the future of that branch of the Service in which many officers are so deeply interested, and of which many others, I regret to say, are so profoundly ignorant.

In 1887 Colonel Savile, Chief Instructor of Tactics at the Staff College, Camberley, retiring from the Service, took over the command of a Volunteer Cyclist Corps, 120 strong, which had been raised by Majors Carpenter and Hewitt, formerly of the Carabineers; he suggested that this new Corps should be designated the "Cyclist Guides" or "Cyclist Scouts," which sufficiently denotes the duties which, with his great experience, both of military matters and of cycling, he thought this corps might most usefully perform. However, the authorities preferred to give this new regiment the title of "Cyclist Rifle Corps," thereby implying that the men should be trained to undertake a very different *rôle* in war. I have elaborated this point, as I am desirous of showing how from the very start the aspirations of cyclist officers, even such an officer as Colonel Savile—an expert not only in cyclist work but also a professor of tactics at the highest military academy in this

country—have been damped and overruled by those in authority—men who had no pretensions to be considered experts in at least one of these subjects.

During the ensuing decade cycling became general amongst the civilian population throughout the country, and was no longer considered a sign of crankiness or misplaced enthusiasm. The cycle, however, was still an expensive luxury; it had not yet become an economic necessity to the masses. The result was that men with means or leisure invested in cycles. Many of these happened to be members of Volunteer Infantry Regiments; thus cycling sections sprang into existence throughout the Volunteer Force. But the cycle was still too expensive an item to be indulged in by the men of the Regular Army. The hire-purchase system had not yet come into vogue.

During this period France, of all the Continental nations, was the only country to turn her attention to the cycle as an instrument of war. At first the cyclist was only looked upon as a carrier of messages. One enthusiast, Captain—now Commandant—Gérard, went further, and dreamt of companies of riflemen mounted on folding cycles, the latter being his own invention, of which I intend to say more anon. Certain French journalists, enthusiastic wheelmen, carried on a brief Press Campaign in favour of military cycling, but this gradually fizzled out, with the net result that each French Line Regiment had to content itself with a few cyclist orderlies. These Captain Gérard was wont to get together at the autumn manœuvres and endeavour to manœuvre them as a company. In short, in the matter of military cycling, France was at the end of the nineteenth century exactly where Germany is to-day. England was still a little ahead.

During the years of the South African War a tremendous wave of patriotism brought a great influx of recruits into the Volunteers. Battalions attained and exceeded their establishments, several, indeed, expanding into two battalions. Cycling was also becoming more popular amongst the civilian population. The joint effect of these two factors was that in most cases the cyclist sections of infantry battalions expanded themselves into cyclist companies, the authorised establishment of which was laid down as 1 captain, 4 subalterns, and 116 other ranks; at the same time, the establishment of the Cyclist Rifle Corps was raised from 120 to 240, and shortly afterwards to 361.

There is a point here which I wish to make, as I shall have to refer to it later on. At the commencement of hostilities, Major C. E. Liles, commanding the Cyclist Corps, offered to take out 100 picked trained cyclists to the front. The offer was refused, and the 100 men who would have followed him to the front as cyclists had no alternative but to store their cycles and to enrol in the Yeomanry or Infantry Service Companies—about fifteen of them also joined the C.I.V.'s as infantry—not even as members of the cyclist section, which was formed

of cyclists from the infantry of the Inns of Court V.R.C. Now, I would ask you to note the sequel. Some months later it was considered desirable to raise three companies of Cyclist Volunteers for service in South Africa. These were, in fact, raised and sent out; but the point I wish to draw especial attention to is that the men of these three companies could in no way be considered as the equals either in training or as cyclists of the 100 men Major Liles had offered for service earlier in the campaign. A large majority of them had only joined the Volunteers since the outbreak of war, and practically none of them could be considered as trained cyclists.

The reaction which set in on the termination of hostilities was felt more keenly, perhaps, by Cyclist Companies than by any other Volunteer units. Companies dwindled down to a vanishing point. In 1907, for instance, there were extremely few Cyclist Companies who could muster more than 2 officers and 60 men, and the average number was far below this. Now, in view of the recent abolition of Cyclist Companies, it may be of interest to dilate somewhat upon the result which this falling off in numbers had upon the efficiency of the individual officers and men.

The Volunteer Cyclist was dependent, in order to attain efficiency, upon lectures in theory by his officers and practical training on manœuvres. As regards the theoretical part of his training, it was often a case of who would instruct the instructors themselves. The average Cyclist Company was commanded as often as not by an officer who had been pitch-forked into the command in order to suit the interior economy of the Battalion. It sometimes occurred, of course, that there would be an officer who was particularly keen on cyclist work anxious to take command; but even then there was but little to help him in his task of self-instruction. His brother officers knew little and cared less, if possible, about cyclists. The Adjutant not infrequently looked upon him and his company as a nuisance to be got rid of—to be sent off far away from the Battalion. There were no text-books, no military cycling literature to which he could refer. As often as not he did not even have the advantage of a sympathetic fellow cyclist officer with whom to discuss and argue the pros and cons of cyclist warfare. He had, in short, to evolve a complete *vade-mecum* of cyclist training out of his own mind. Is it to be wondered at that many companies suffered from lack of theoretical knowledge. On the other hand, the greatest credit is due to those officers of Cyclist Companies, who, under these difficult circumstances, were able to teach their men anything worth knowing.

The difficulties of practical training were almost as great. Under the old *régime* an officer considered himself lucky if he got 50 per cent. of his men present at any one parade. This immediately reduced the force available for tactical training on any one occasion to about 30 cyclists. When this force is divided into two in order to provide for an attacker and a

defender, it will be seen that the possibilities of acquiring useful practical training were limited in the extreme, and that the opportunities of training men in the all-important duty of long marches by large columns were practically non-existent.

True, it became the custom in several Volunteer Infantry Brigades during the period of training in camp to brigade all the cyclists together under the command of the senior cyclist officer; but the faults of this system were only too apparent.

It not infrequently happened that the senior officer was by no means the most experienced. There was absolute lack of cohesion or *esprit de corps*. Dissimilarity of training and inter-regimental jealousies did not tend to improve the situation, whilst frequently during the training this or that Cyclist Company would be taken away for one or more days in order to form a skeleton enemy for their infantry to operate against.

All the defects of this system became apparent during the Cyclist Manœuvres of 1906 in the vicinity of Salisbury, in which the Cyclist Companies of no less than six Brigades took part, and which lasted for three consecutive days.

The Cyclist Manœuvres of 1907, during which various companies were attached to the Cyclist Corps, bringing that regiment up to 500 strong, proved the value of the Battalion organisation for cyclists. In this case it may be worthy of mention that the operations were continuous for three days and nights, and that the enemy were supplied by cavalry and infantry units of the Regular Army.

During the present year the whole of our cyclists have been reorganised. Companies have been abolished; in their place ten battalions of cyclists have been created, each battalion consisting of 8 companies of 60 men and a machine gun section; that is, 502 men and 21 officers—523 in all, which total includes 22 motor drivers for 11 motor transport vehicles, 8 of which latter are imaginary and only used for mobilisation and documentary purposes.

The primary duties of these Battalions is coast defence. Otherwise they are Army troops and are attached to Infantry Brigades for administrative purposes—a system which most of us trust to see simplified at an early date.

Infantry Battalions are still permitted to retain a cyclist section, consisting of 1 officer, 1 sergeant, 1 corporal, and 12 men, for purposes of scouting and dispatch carrying.

Meanwhile in the Regular Army the cheapness of the cycle has led to its popularity and incidentally to its use on manœuvres in a modified degree. As scouts and dispatch riders their services have been found invaluable, notably in cavalry regiments, where their use has resulted in a great saving in horse-flesh and time.

Turning to the Continent, we find that France still holds the lead, and has one permanent Company of Cyclists forming part of various rifle battalions, in addition to a liberal supply of cyclist orderlies and scouts in every regiment. The doings of

the French cyclists at the Grand Manœuvres this year will still be fresh in everybody's memory, and I will not enlarge thereon, save to express a hope that some time in the near future we will copy the French idea of employing cyclists in conjunction with, or in the place of, cavalry.

The Italians have during the past year turned four companies of Bersagleiri into cyclists, and also greatly increased this establishment during the manœuvres. Large bodies of cyclists operating against cavalry also formed a feature of this year's manœuvres in Belgium.

Germany is still a long way behind the above-named countries in the matter of military cycling, chiefly, I am inclined to believe, for two reasons: The German bicycle is a very inferior article; secondly, the German soldier is not physically well adapted for cycling.

I have ventured to make a synopsis of the past history of cycling in the hope that my subsequent remarks may carry more weight; but before I enter upon the various strategical and tactical effects which I maintain the advent of the cycle should produce, it is essentially necessary that I should make clear what I understand by the term "*Trained Cyclist Soldier.*" The definition which I am about to give is one, I believe, which is generally held to be correct by all cyclist officers, and yet it is a definition which I venture to think has not entered into the calculations of one out of every thousand officers of other arms of the Service. The definition which prevails generally might be summarised as "a trained infantryman who can ride a bicycle." That is not at all my definition. I prefer to call that man a "Cyclist Infantryman." I should no more dream of calling him a "trained cyclist" than the average cavalry trooper would refer to a man going through an M.I. course as a "rough rider." I am desirous to labour this point, as I am under the impression that outside the Territorial Cyclist Battalions there are not a dozen officers who know what a trained cyclist is, nor what can be expected of him. The reason of this is that we are a horse-loving people, and the class from which our officers are drawn are mostly born and brought up to the cult of horse-flesh. We know a great deal more about horses, and even motors, than we do about bicycles or riding them. Unfortunately for the cause of military cycling the bicycle is a useful adjunct of every-day life, and we have all learnt how to ride one. We therefore venture to look upon ourselves as cyclists, and when we consider the question of what utility men mounted upon cycles could be in actual warfare, we unconsciously take ourselves as a criterion of cycling prowess. We therefore in our ignorance say that cyclists are all very good on the roads, but are useless across country. We bewail the frequency of punctures, and we turn our minds to more profitable matters. I wish to point out most emphatically that the cycling capacity of the average gentleman who rides a bicycle when compared to that of the trained cyclist soldier, is as futile and

incomplete as the oarsmanship of the person who sculls about the Serpentine in summer time compared with that of a 'Varsity oarsman. I am anxious that this point should be thoroughly appreciated.

I want you to consider the case of the class of men from whom our Territorial Cyclist Battalions are recruited. The vast majority of them are well educated clerks with a fair percentage of skilled mechanics and tradesmen. These men in every-day life practically live on their cycles. Wet or fine they cycle up to business from their homes. In London the distance is generally a matter of five or six miles each way with plenty of traffic to contend with. Consider that to them expertness in cycling means so many extra minutes in bed of a morning; so much additional time to themselves on their return at night. Not only is their cycle their principal means of conveyance, but in most cases it is their chief source of relaxation. In my own Battalion we have scores of men who average 40 and 50 miles a day a-wheel; men who, when they go away for a week-end to the sea in Essex or on the South Coast, never dream of going by train; men who think nothing of taking a spin round Windsor Park before they start off to business in the City, just to keep themselves fit.

The average gentleman only uses his bicycle as a means of transit for short distances, and is usually content to go round by the road; but the man who looks upon his bicycle as other men look upon their horse is not content to confine his cycling to the roads—he rides it over all sorts of country. Consider the value of this man when he is especially trained to ride over rough country, as is the case when he becomes a Territorial Cyclist. Personally, I can assure you after eighteen years' experience in many countries, including the mountains of Wales and Spain and the delta and deserts of Egypt, that there are uncommonly few spots on the face of the earth where a good cyclist cannot ride. Even ploughed fields are rideable if you go with the furrow, and fields of standing grain, maize and clover invariably have negociable tracks through them. It must be remembered that a track five or six inches wide is amply sufficient.

Not only does this question of expertness a-wheel affect speed and render cross-country riding possible, but men who ride continually acquire great mastery over their machines, great rapidity in mounting and dismounting; facility in finding cover for themselves and their cycles. To give some idea of what this means: A trained cyclist recently underwent some tests at Hythe over the grass and shingle tracks that intersect the ranges, which are by no means ideal tracks for cycling. In each case time was taken from the prone firing position at the start to the prone firing position at the finish. In addition, therefore to rising, attaching arms, mounting, riding the distance, dismounting, detaching arms, and assuming the prone position again, the cyclist also had to go through the loading motions at the start and at the finish.

The official timing was: 750 yards in 79 seconds (or a fraction under 20 miles an hour); 100 yards in 21 seconds, and 25 yards in 5 seconds; the last named will perhaps give some idea of the capabilities of a trained cyclist. I doubt if it is generally known that it is nothing extraordinary for a cyclist to be able from the prone firing position to unload, rise, pick up his cycle, attach arms, mount, cycle 25 yards over a grass and shingle track, halt, dismount, ground cycle, detach arms, lie down and load, all in the short space of 5 seconds. I should not be surprised if many people imagined that it took a trained cyclist nearly five seconds only to mount his cycle.

But I have not yet completed my definition of the trained cyclist. Drawn as he is from the best of the middle classes, he is very quick at assimilating information. An endeavour is made to teach every man at least as much about scouting as is learnt by the trained scouts of infantry battalions; in addition to this, special men are chosen to undergo further instruction of a more advanced and technical nature. Add to these qualifications the fact that the great majority of the men are athletes, and when not cycling are wrestling, boxing, rowing, or playing football, and you will have a fair idea of my definition of a trained cyclist. It may also perhaps be of interest to note that the great majority of cyclists are practically teetotalers. As an example I may state that the battalion to which I belong, during the fortnight it was in camp, although there were 340 men under canvas, only managed to consume 18 gallons of beer.

The question now arises, given this material to work with, what are the capabilities of the cyclist in war? I venture to suggest that this is a question which has never yet been asked or answered officially in full. Its solution has never been approached in what I maintain is the correct manner to approach all new factors which may prove of military service. I put it forward as an opinion that hitherto this important question has been asked and answered in somewhat the following casual manner:—

"Here is a man who rides a bicycle; what shall we do with him?"—"Set him to carry dispatches."

Then later:—

"Use him to scout for his infantry battalion."

And still later:—

"But this man carries a rifle; what else can we do with him?"

And the answer comes back pat:—

"Oh, use him to seize points of vantage and defiles!"

Finally, and latterly:—

"Let us also use him for coast defence, since his cycle enables him to concentrate quickly at any threatened point."

I put it to you that this is not a logical method of approaching the subject. During the past twenty years a new invention has matured which enables a soldier to go four times as fast and four times as far as he could possibly go on his feet. Is not this invention worthy of closer study than it has at present attracted? I will endeavour to prove that it is, but I will approach the subject in a more logical manner.

I have just set forth the capabilities of the individual trained cyclist; I will now consider the capabilities of organised units of these cyclists. I will detail their advantages and disadvantages as compared with other arms. It will then be time to decide whether cyclists fulfil a long-felt want or can advantageously replace or supplement existing organisations. If not, then let cyclists be ruthlessly expunged from the Army List. But, on the other hand, if we find work for which cyclists are peculiarly adapted, then let us at once hasten to train them for that work, and let us also make known to other arms of the Service, through the medium of "Combined Training," exactly what that work is. I will, for the purposes of this lecture, confine myself to the exigencies of Home Defence.

A well-trained cyclist unit consists of a body of riflemen scouts capable of moving at an average rate of 80 miles a day (or 12 miles an hour for shorter distances) along English roads or lanes. In the case of paths and field tracks, these figures should be reduced by one quarter. A bicycle fitted for military service will cost about £8, and will last from three to four years. The cycle itself offers an infinitesimal target, seldom requires adjustment; when it does, adjustments can usually be made in a few minutes by aid of tools carried on the cycle. The cycle not only transports its rider, it is capable of transporting quite a considerable amount of impedimenta, which will add greatly to the comfort and independence of the men, such as blankets, waterproof capes, food, extra ammunition, and last, but not least, the rifle itself. It is an indisputable fact that a cyclist after an eighty mile ride in full marching order is far less tired than the infantryman who has done his 20 miles, or the cavalryman who has done forty miles; and in the latter case I carefully abstain from referring to the feelings or condition of the horse. The cyclist does not suffer from sore feet, nor does his mount ever get out of condition. The longer a campaign lasts the fitter the cyclist becomes, the more capable of accomplishing longer marches with less fatigue. When on the move the cyclist offers a much smaller and at the same time more difficult target to hit than even the infantryman. He can ride behind hedges with body bent low and remain invisible, although moving still at full speed. His movements also are entirely noiseless.

There is also one other advantage of supreme importance to a mobile force. The greatest war-master of modern times has said that an army marches on its belly. It is generally admitted that one of the most difficult military problems is the feeding of

an army in war time. Now, the cyclist can not only without undue inconvenience carry three days' rations in his valise, but he is also peculiarly well equipped for obtaining the last edible commodity from a country-side. If he finds himself in a place where food is unprocurable, it is no great hardship to him to cycle an additional ten miles or so to a more hospitable neighbourhood. Large cyclist units in a sparsely provisioned area could break up into small detachments, scatter several miles in search of food, and concentrate again when the commissariat stores had been replenished. Even in the most rural portions of England a Cyclist Battalion should be able to live on the country in which it is operating, irrespective of supplies carried by its own motor transports.

Now let us glance at the reverse of the portrait. When the cyclist leaves the road his speed is greatly reduced; but this is also the case with every other arm of the Service. In a close country like England, intersected by hedgerows, ditches, and fences, neither artillery, cavalry, nor infantry will even approximately attain the prescribed average rates of speed laid down for those arms when marching across country. Exception may perhaps be made in the case of Salisbury Plain and the Wantage Downs; but those are not localities which an invading army is likely to visit, and moreover I have cycled over every mile of these localities and I am prepared to assert that although by no means ideal country for cyclists, there is no portion thereof where trained cyclists could not move at the rate of eight miles an hour. I trust that this assertion will give food for thought when considering the possibilities of cyclists in even a Continental theatre of war.

Another disadvantage frequently imputed to the cycle is its liability to puncture, its liability to skid on muddy roads. After all, a puncture is not a very serious matter, and any cyclist worth his pay should be, and is, able to repair the damage in ten minutes at the outside. Here again I would animadvert to another incidental advantage. In slow-moving arms, more especially in the case of infantry, a man who once falls out has very little hope of rejoining his unit until the end of the day. It is different in the case of the cyclist, where the flexibility of pace is so great. I will illustrate my meaning. Given a company of trained cyclists, the average riding pace of each individual man will probably be 13 or 14 miles an hour, and say 17 or 18 miles per hour at full pressure. That company, when route marching, will probably not average much more than 10 or 11 miles an hour. A man therefore who falls out to mend a puncture will rejoin his unit just about 24 minutes after he fell out and at a distance of about 4 miles beyond the point where he punctured. Under these circumstances a puncture can hardly be considered as such a serious stumbling-block as most critics would imply. Added to this puncture statistics, carefully compiled during several years' experience, tend to show that a man has a puncture on the average once in every 210 miles.

There are not many arms of the Service, I venture to suggest, where a man can boast that he has not been absent from his place in the ranks for one reason or another for less than 24 minutes in a march of 210 miles.

The question of skidding on muddy roads is purely a question of capable riding. I do not mean to imply that trained cyclists never have side-slips; such a contention would be puerile. But I do contend that trained cyclists do not fall off or come down when their cycle skids — it is merely an unpleasant moment, much the same as when an expert rider's horse suddenly shies in the midst of a gallop.

The only other drawback that I have heard alleged against the cyclist as a military factor is that cyclist columns cover an inordinate length of road space. This contention is partly true, partly exaggerated, and the whole of the truth is not stated.

It is perfectly true that partially trained cyclist units tail out to inordinate lengths. The new Cyclist Training, 1908 (provisional) lays down that cyclists should ride in file with a distance of 12 feet between succeeding files. Those of you who have had any experience of well-trained cyclists will bear me out when I say that this distance is quite unnecessary and unusual. Except when riding down a steep hill or in a very up-and-down country, it has been the endeavour of cyclist officers to make their files lock up to a distance of one foot, or at most, one yard, and this endeavour is successful if the men are properly trained and officers and non-commissioned officers do their duty.

This will give a road space for a battalion on the march (allowing intervals of 10 yards between companies) of about 800 yards. I admit that this would on the first glance appear excessive, but it must be borne in mind that this road space is only occupied for a very short period— three minutes at most— owing to the rate at which cyclists travel, and that the rear man could deploy on the alignment of the front file in just as short a space of time as could the rear four of a battalion of infantry marching in fours, even if the infantry moved at the double.

It will be observed that in dealing with the alleged disadvantages under which cyclists are supposed to suffer I have had frequent recourse to the term "trained cyclist." It was for this same reason that in the earlier portion of my lecture I dilated somewhat lengthily on the qualifications of the trained cyclist. As regards the untrained cyclist, I have no more use for him than the average critic of military cycling has for the trained cyclists, of which he knows so little. The partially-trained cyclist is not only useless, he is a waste of the taxpayers' money, a danger to himself and to any troops in conjunction with which he happens to be acting.

It is possible that in the discussion which will follow on the conclusion of this lecture someone will endeavour to refute some of my arguments by adducing the instance of the cyclist com-

panies who fought in South Africa. My reply is—and I have it on the best authority, namely, that of an officer who commanded one of these companies, and who was subsequently attached for several years to the Cyclist Battalion to which I have the honour to belong—that the men who composed those Cyclist Companies were, in comparison with the men of the battalion in question, only partially trained.

Having set out, then, the capabilities of properly trained cyclist units, let us consider their strategical and tactical potency for war. It will not be necessary to deal with cases in which their utility has already been recognised, such as despatch carrying, seizing of defiles, scouting for infantry, and coast defence. As information on these subjects can be obtained from the newly published text-book, I propose rather to lay before you other vistas of employment which have not hitherto been recognised as peculiarly suitable to cyclists.

Firstly, I submit for consideration that cyclists are peculiarly adapted for staff work, more especially for that portion of staff work which deals with the acquisition of information of the enemy's movements during the progress of a campaign.

A general officer commanding an army in war time is dependent on various sources for information of the enemy's movements. Most of these sources, being civilian, are unreliable. History has repeatedly proved that the strategical cavalry, military officers in disguise, and special reconnoitring patrols led by a staff officer in person are the only reliable means of gathering accurate and useful information. The first method is costly, entailing an extravagant wastage of horse-flesh, and is an improvident use of large bodies of cavalry which we, for instance, could ill spare, considering our weakness in this arm of the Service. The second alternative is one that does not commend itself to British officers, whilst the third expedient necessitates the absence (and risk of capture) of those very officers whom a general would be most anxious to keep about him to sift the intelligence reports brought in through other channels. If such work as this were entrusted to specially raised companies of Cyclist Scouts, who were trained in peace time to the niceties of secret service work, and were educated in all the details of the organisation, uniform, etc., of foreign armies, officered by men who thoroughly understood what information was most required and the best means of obtaining it, I venture to think that the duty in question would be satisfactorily performed with far less cost of life and with far greater accuracy and speed than is provided for under existing arrangements.

It may be argued, admitting that this employment of cyclists is sound, that it would be easy on the outbreak of war to commandeer a company of cyclists for this purpose from the nearest Cyclist Battalion. Such an eleventh-hour expedient has disadvantages so obvious that there is no need for me to name them. It must also be borne in mind that officers commanding Cyclist Battalions are but human, and that they would hardly be likely

to detail their best officers and men for this extra regimental duty, whilst it is clear that nothing short of the best would be of any good at all. If it is considered that companies of specially trained cyclists would be valuable in this connection, these companies should be raised in peace time, say one in each command, performing part of their annual training with the nearest Cyclist Battalion and part thereof at a staff ride held by the G.O.C. At other times they would receive instruction in their peculiar duties from staff officers, and their officers might acquire much useful practice by engaging in secret service work. A certain number of motor cyclists would of course form part of the unit. Each man would be required to pass an examination annually in such subjects as the equipment, organisation, and clothing of foreign armies, military sketching and topography, photography and telegraphy. A small bounty might be paid annually to those who qualified in this examination.

I will leave these hypothetical staff companies in the limbo of things uncreated, from which I have evoked them and to which they will doubtless return, and consider the utility of the Cyclist Battalions which actually exist. Strategically I suggest four duties to which they can be profitably assigned, in home defence, namely:—

1. The garrisoning of an area temporarily deprived of military forces, but liable to incursion by the enemy.
2. In conjunction with strategical cavalry.
3. To make incursions into areas held by the enemy.
4. To operate against the enemies' lines of communication.

Taking these four cases in the above order, I ask you to consider the case of what provision would be made for the garrisoning of Scotland, the North and the Midlands in the event of a hostile landing in force in Kent and East Anglia, in the conceivable event of a large proportion of the Regular Army being abroad?

We have been told *ad nauseam* that our Territorial soldiers are totally unfit to meet equal numbers of foreign conscripts; it may therefore be taken for granted that every available man would be wanted in the area of hostilities in order to make up in numbers what we lacked in efficiency. On the other hand, both from a military and political point of view, it would be impossible to totally denude the Midlands and the North of troops for fear not only of another landing or a cavalry raid, but also of local rioting. Considering the great extent of country to be thus garrisoned and the probability that railway communication would become impracticable, it would either be necessary to leave very considerable numbers of troops distributed throughout the area or to employ a relatively insignificant number of mobile troops, such as cyclists, at places within 24 hours' march —say 100 miles—of each other, thus setting free for service at the front great numbers of troops who otherwise would have to be retained on garrison duty.

In a recent number of the "Cavalry Journal" I have dealt at some length with the subject of the employment of cyclists in conjunction with cavalry, strategically and tactically. It will suffice to summarise in this matter. I suggest that the attachment of a Cyclist Battalion to the strategical cavalry would not only vastly increase the range of operations of these latter, but would also greatly increase their fighting value in the event of collision with the enemy; and I suggest that the fact that this additional fighting power was at hand would increase the *moral* of the strategical cavalry, and thus enable them to push on and undertake enterprises which they might not otherwise feel strong enough to embark upon. The cyclists also might be employed in this connection to create diversions and distract the enemy's attention from the movements of the cavalry; or again, they might also be pushed on far in front to cover the movements of the cavalry; in other words, the Cyclist Battalion might perform the same services towards the strategical cavalry as these cavalry themselves were performing towards the army.

My third and fourth points may be dealt with together, namely, the making of incursions into areas held by the enemy and raiding his communications. In this connection I submit that the long-distance marching power of cyclists is in itself a factor of great strategical value. The fact that in 24 hours cyclists could cover 100 miles would be likely to get on the nerves (and so affect the *moral*) of small detached columns and garrison posts. A few dashing cyclist raids at the commencement of a campaign, even if unproductive of tactical results at the time, could not fail to impress an emeny with a sense of insecurity and force him not only to greatly increase the number of troops on his lines of communications but also to increase the size of detached columns and the escorts of convoys, and thus reduce his striking power at the front.

In the latter stages of the Boer war we had many excellent examples of what a few hundred mobile men can do to upset the calculations of a relatively enormous garrison distributed over a wide area, and the incalculable damage that they can inflict in the matters of *moral* and *prestige*, not to mention more tangible results, and these results were obtained notwithstanding the fact that we had in South Africa large numbers of equally mobile troops wherewith to cope with the wandering Boer commandoes. Now, a Cyclist Battalion in England would be infinitely more mobile than even Christian de Wet at his best, and at present there is no Continental Power possessed of equally mobile troops wherewith to hound them down.

To give an illustration of my meaning I will ask you to consider the possibilities of an imaginary situation, and one in which I place the cyclists in an infinitely more difficult position than our Cyclist Battalions would occupy towards an invading army. Imagine that the ten Cyclist Battalions of the Territorial Army do not exist. Imagine that to-night three battalions of well-trained cyclists were to invade our islands,

landing respectively in Forfarshire, Yorkshire, and Dorset. I want you to consider what steps would be necessary with the whole of the Home Army at your disposal to bring those Cyclist Battalions to bay and force them to surrender. I ask you to consider how many days it would be likely to take to effect their capture; and, lastly, I ask you to attempt to form an estimate of the immense damage to prestige, life, and property those fifteen hundred men would have done in the meanwhile. I think you will find that the more deeply you go into the details of this imaginary raid the more feasible it will appear to you. I venture to add that I believe the easiest solution of the situation would be to mount large bodies of infantry on commandeered bicycles, for railways and telegraphs would be tampered with, at all events within the zone of action of each raiding party.

I will now deal with cyclists from the tactical aspect; but before entering into details I am anxious to point out that I deprecate the employment of cyclists in the firing line when other troops are available in sufficient quantity to obtain the desired objective. The cyclist is, or should be, too valuable. Immobile in the firing line, he can only be counted as one rifle; on the flanks or rear of the enemy he becomes an unknown quantity, menacing retreat and communications. There are circumstances in which a commander would be justified in sacrificing his cyclists in order to obtain some definite object; but it should be taken as an axiom that when two armies are joined in battle the cyclists should be withdrawn from the firing line and replaced by infantry. It would be sheer waste to risk the most mobile troops in a situation where they become totally immobile, and where less mobile troops, such as infantry, would attain equally good resutls.

In a battle in which all arms are engaged the objective of the cyclists should be the extreme flanks and rear of the enemy. In the event of victory the enemy's retreat will be greatly hampered, more especially by the shooting down of gun teams withdrawing from the action, and by the successive occupation of defiles and of commanding positions.

In the event of failure of their own side to attain success, the cyclists could greatly impede the movements of the enemy's reinforcements, more particularly the replenishing of his ammunition supplies.

In the event of defeat, it would become the duty of the cyclists to assist the rear guard, and this is one of the occasions which would justify their inclusion in the firing line.

When acting on the defensive in conjunction with a force of all arms, cyclists might be employed either with the general or local reserves, being held in readiness to rapidly reinforce any threatened portion of the firing line, or else to hold until the last moment some outlying work or post in advance of the general line of defence. They might also be usefully employed like machine guns, to hold salients. But a far more legitimate use for the cyclist would be to employ him far out on the

exposed flank. Here he would be in a position to outflank any attempt of the enemy's to turn the flank of the main position, and yet, owing to his mobility, he would be capable of being brought back to join the main defence if circumstances rendered this course advisable; also there would be no fear of his being cut off, owing to his speed of movement.

In tactical conjunction with cavalry, cyclists would prove invaluable as a rear guard, securing these from pursuit by hostile cavalry. I do not think that even in England cyclists could advantageously supplant mounted men in the duties of protective cavalry, but I am of opinion that in the cases where large bodies of troops are concerned, the addition of a Battalion of Cyclists to the protective cavalry would prove of great assistance, not only to the cavalry themselves but to the troops protected. They would be admirably adapted for the purposes of forming a flank guard or an advancing screen ahead of the columns, for it must be remembered that a Cyclist Battalion extended over a front of 20 miles can concentrate in 40 minutes at a central point, or at either flank in about 1 hour and 35 minutes.

I have one other suggestion to make as regards our own cyclists, but I am afraid that the proposal is so unorthodox that it may not be taken seriously. The suggestion is that a force which contained a sufficiently large number of cyclists might, except when actually in the face of a hostile force, almost entirely dispense with night outposts. It will be admitted that an enemy making a night march or night attack—at all events in England—would be obliged to keep to the roads until it approached close to the bivouac. The scouts of this force also would not begin to work across country until they were within 5 or 6 miles, at most, of their objective. I suggest that a weak screen of standing cyclist patrols watching all roads at a radius of, say, 10 miles from the camp would secure the same immunity from surprise as would a large force of infantry on outpost. If each standing patrol were also furnished with a motor cyclist to give early warning of any hostile movement, I maintain that this warning would reach the camp at least two and a half hours before the enemy's infantry, or one and a quarter hours before the enemy's cavalry; much longer warning, at all events, than would be secured by an ordinary outpost line. I need not enlarge upon the great boon which immunity from night outpost duty would confer upon the column, enabling it to make much longer marches by day. At the same time, it would be no hardship to the cyclists, provided always that in addition to this duty they were not expected to undertake extensive other duties during the day.

It may be of interest here to note the views held on the Continent as to the employment of cyclists; but before doing so it is necessary to emphasise the fact that in no case do Continental military cyclists attain anything approaching the cycling powers possessed by the expert cyclists of our own Territorial Army. This fact necessarily narrows the field of their utility.

France, until this year, looked upon cyclists as infantrymen, who mounted their cycles when the country was favourable. This year she has experimented with them, and with great success, both in conjunction with and also in lieu of strategical cavalry.

Germany looks upon cyclists as Army Corps troops for purposes of supplementing the divisional protective cavalry.

Belgium is inclined to allot to them the roving commission of free-lances, for the purpose of raiding the enemy's communications. Italy remains undecided whether to use them as contact squadrons or as frontier guards.

Before I conclude my lecture I desire to make a few suggestions as to equipment and organisation, which, in my opinion, would tend to increase the efficiency of our Cyclist Battalions.

Firstly, there is no provision in the present establishment for motor cyclists. These I consider are absolutely indispensable for the purposes of carrying information and despatches rapidly from one body of cyclists to another. They are totally unsuited for scouting or joining the firing line by reason of their unwieldiness, liability to get out of order, and the noise they make; but they might very frequently replace signalling communication. There should be not less than 20 in the normal establishment of every Cyclist Battalion, 2 with each company and 4 with headquarters.

Secondly, each Cyclist Battalion possesses (on paper) two machine guns. It is proposed to supply these with motor transport. Some twelve years' experience of a cycle-drawn machine gun has convinced me that this latter is the more suitable method of traction, provided that the new light-weight Maxim, together with the Mark IV. tripod, can be served out. It is easy to design a light carriage on the principle of a trailer which would carry the gun ready mounted on its tripod, and all that would be necessary to bring it into action would be to lift the tripod bodily out, releasing it from a spring catch. While considering this question I would commend to the notice of tacticians the possibilities of cycle-drawn machine gun batteries of 8 guns, the detachment also being mounted on cycles, forming a portion of the divisional troops. The Maxim is essentially a weapon of opportunity, and the more speedily the gun can be transported from place to place the more opportunities are likely to be available.

The progress also of wireless telephony is being closely watched by cyclists in the hope that, when efficient working over distances of about ten to twenty miles has been secured, Cyclist Battalions will be allowed to add a wireless telephone section to their establishment.

As regards armament, it may not be generally known that in future cyclists are not to be provided with bayonets. It follows that there is no longer any excuse for not issuing to them the new short rifle, which would be a far handier weapon for them to carry on their cycles than the present L.E. rifle. But if cyclists are to be deprived of their bayonets, I wish most

emphatically to say that some other auxiliary means of defence should be supplied to them. In war time cyclists will have to incur tremendous risks; they will have to be very daring, both individually and collectively, in order to obtain the best results. The cyclist will not be very daring—it is contrary to human nature—unless he feels confidence in himself and in his means of defence. I suggest that every cyclist should be armed with a revolver. He may seldom have occasion to use it, but its mere possession will give him great confidence, and to obtain information he will venture in areas infested with the enemy's cavalry patrols, which otherwise discretion would counsel him to leave severely alone unless he wished to be cut down by horsemen whilst riding along defenceless upon his machine.

There are, more especially on the Continent, critics who advocate the use of the folding cycle for military purposes. I cannot but believe that these must mostly be people who have never ridden a folding bicycle. It is heavy, lacks rigidity and strength, entails loss of time in folding and unfolding, and even when it has been folded and is strapped on to the back in such a manner, by the way, that it cannot possibly be unstrapped except by the assistance of a comrade, it is the most unwieldy burthen I have ever carried.

The advantages claimed for it, even if real, would hardly compensate for these drawbacks; but the advantages are theoretical rather than practical. It is claimed that cyclists when they wish to cross fields, etc., will dismount, fold their bicycles and stow them on their backs. I was once the proud possessor of a folding bicycle, which I used for experimental purposes, and I can assure you that for half a dozen excellent reasons nothing would induce me to take one on service, or if I did it would never be folded except when the spring got out of order and it collapsed automatically, which is one of its unexpected habits.

The only real advantage which can be claimed for it is the facility with which it can be stored or transported by rail. I take it, if ever this country were invaded, those railway systems which were intact would be congested by the transport of slow-moving units, and that cyclists would have to move by road.

Lastly, I wish to animadvert to a question of training. There can be no real efficiency without cohesion; cohesion is only obtainable by similarity of training. It is not sufficient to lay down in a small official volume the general lines on which training should be carried out; it is essential that all Cyclist Battalions should train alike in every detail. To attain this end two things are necessary: a class of instruction for young cyclists officers and a central cycling authority. This latter want could be supplied by the appointment of a competent officer as Inspector-General of Cyclists. It would be part of his duty to assimilate the training of all Cyclist battalions, and also to attend to those matters which are dealt with by Brigade Commanders in the case of infantry. It is important, I venture to

think, that this officer should combine with other necessary qualifications an experience and a knowledge of cycling and of cyclists' capabilities, requirements and duties, at least as great as, if not greater, than that possessed by the officers of the battalions it would be his duty to inspect and supervise.

At the present moment cyclists is the only arm of the Service in which we are better supplied than the armies of other nations. Let us at least maintain this lead. I put it to you, under existing circumstances is not the study of the tactical and strategical potency of the cycle in warfare incumbent upon officers of all arms of the Service? Is not the cycle as an engine of war worthy of greater consideration than has been accorded to it in the past?

Colonel T. Sturmy Cave (Commanding South Midland Brigade):—In the few observations that I have to make, I hope my friend Captain Trapmann will not think that I do not entirely appreciate the value of his paper and his zeal and ability as a cyclist officer, of which I have had experience, as he was on my staff at the cycle manœuvres in 1906. I do not, however, think he takes a sufficiently broad view of the cyclist in war. He seems to desire to confine the energies of the cyclist in war to isolated cyclist battalions. What has recently taken place in reference to our 2nd line military cyclists is as follows: There existed in the Volunteer Force 8,000 cyclists, who were all members of cyclist companies of infantry battalions, with the exception of about a couple of hundred who belonged to that cyclist unit of which Captain Trapmann is so excellent an ornament. We had 8,000 men available. All these have been disbanded with the exception of Captain Trapmann's 200, and 2,800 have been enlisted in cyclist battalions with an establishment of 5,230. Now, if these cyclist battalions are to efficiently perform the *rôle* that Captain Trapmann has sketched out for them, and that appears to be contemplated in the text books recently issued by the War Office, instead of there being 3,000, which is the present strength, or even 5,230, which is the full establishment of the 10 battalions authorised, there should be a hundred battalions, with an establishment of 50,000. Surely this will be necessary if they are to form a watching line along the coast of Great Britain, or even confine themselves to those portions of the coast where landings are available. Although I wish every success to the 10 battalions authorised, I say that even a good thing may be purchased at too high a cost. If it be that this impoverished country cannot afford the few shillings that are necessary for the cyclist companies of the infantry battalions and for these cyclist battalions as well, then I cannot help thinking that it would be much better to devote its money to the cyclist companies of the infantry battalions; nay, I am convinced that from a broad military point of view the country which sees the desirability of every infantry battalion having its cyclist company, of every cavalry regiment having its cyclist company, and of every brigade of artillery having its cyclist company will greatly increase its military efficiency. It is, so to speak, a very cheap organisation, because the cycle eats nothing, it costs but little, and it takes up very little stable room and accommodation. All it wants is a small pot of oil and a few patches of india-rubber to repair the tyres. I feel convinced that the country which adds to its establishment these cycle details to every one of its arms will score enormously if it meets an enemy that has not taken that advantage. I am very glad indeed to hear

that other Continental nations have not taken that step, and I hope that our own authorities will have the wisdom to do so before long. Captain Trapmann alluded in one portion of his lecture to the advantage of cyclists co-operating with other arms. I cannot help thinking that both in scouting and in screening—we can apply the word "screening" to all the advance guards and rear guards and flank guards and outposts—they will be immensely valuable; but if the force that is to be screened has its own units, its own comrades to do it—as with the old cycle companies—it will be a very great advantage. Captain Trapmann has alluded to the cyclist manœuvres in 1906. I had the honour of commanding those manœuvres, and Captain Trapmann was one of my staff officers. He says that all the disadvantages of the regimental system of cyclists were then shown to exist. I beg to disagree with him entirely. There was one very great advantage which was shown to exist, and that was that 1,200 cyclists came forward and took part in those manœuvres. They demonstrated many things that were necessary. They demonstrated, in the first place, the desirability of similar manœuvres in 1907 and in 1908, which I very much regret to say we did not get, because during those two years an effort was going on to limit and stop and cut up these infantry battalions in order to make the cyclist battalions. That, I think, was a very great pity. Those manœuvres demonstrated the desirability of cyclists always co-operating with other arms. We very greatly felt the want of mounted infantry in those cyclist manœuvres. Cycles get on excellently as long as they have to be ridden over grass or on the plain or along the beautiful roads that you always find in England; but when it comes to a stretch of moor or heath we felt very much indeed the want of men mounted on horses, and if had been possible to have had a couple of batteries of horse artillery as well, we should have found still greater advantages. To my mind, for strategic and also for tactical operations you want a combination of all the arms; the idea of cyclists operating independently is a mistake. The greater variety we can get, and the more completely we can get all our arms to co-operate together, the better they will be able to fulfil their military functions. A splendid organisation of cyclists would be a section with every infantry company and a section with every battery forming part of the company or battery. These would form a company as part of every battalion of infantry and brigade of artillery. So far as the infantry organisation is concerned, when the brigade commander desires, his four companies can be used as a cyclist battalion. Captain Trapmann has told us that for outpost duties cyclists would be invaluable. I agree; I have tried it. I have marched an infantry force through sixty miles of country with a couple of cyclist companies which were responsible for all our screening work, both by day and by night. We frequently see in reading history that the infantry are often marched off their legs, and get on to the battle-field in such a condition that they have not sufficient physical energy left to fight to really do themselves justice. If all the screening work was done for them by their own trained cyclists they would be able to go on to the battle-field fit, because it would obviate the necessity for the marching men being every third night on outpost duty. Fifteen or twenty miles' march is nothing to a cyclist; he does it so quickly that it gives him ample time to rest and yet do his work at night. It does seem to me that if we are to learn anything from the last two campaigns, one lesson is certainly, that in future divisions will have to march on a very broad front, perhaps on parallel roads ten or fifteen miles apart, and if each divisional general had his own cyclist battalions formed as described, with the infantry cyclist companies under officers whom he knew and who

knew him, it would be an immense advantage. They would always be there, whereas if they had to be told off from independently-formed units, the probability is they would not be there at all. I have alluded to the fact of their being there by saying that in 1906 we had from six brigades 1,200 cyclists. I greatly appreciate the value to the infantry of having cyclists with us. Captain Trapmann mentions that cyclists would be sent out perhaps to take up a position for the infantry to attack, and he seems to look upon that with some degree of contempt. I beg to point out to him that no more valuable instruction can be obtained for the cyclists themselves than that they should do so, or that they should be sent on to reconnoitre a position before the marching infantry. I say, send cyclists on to reconnoitre, but let us have our own cyclists to do it—men that know us and that we know, and not an independent party that very likely would not be there at all. Last year, as our cyclist companies were abolished, I officially applied to have a cyclist battalion attached to the brigade in order that I might have the advantage of their services in training my own infantry, and I venture to think that they possibly might have learned something—a good deal, perhaps—with us; more, I think, than if they had been taken out by themselves, but owing to the change of system they were not forthcoming. I would like once more to insist upon the desirability of the old plan of a company for each battalion being resuscitated as soon as possible, and I do think with regard to the whole of our Regular Army they will do wisely and well if they institute a cyclist company with every battalion of infantry, with every battery of artillery, and with every regiment of cavalry.

Colonel F. W. Romilly, C.V.O., C.B., D.S.O., Commanding Scots Guards:—I did not intend to make any remarks on this paper, but I rise for the purpose of entirely associating myself with the views put forward by Colonel Cave, as to the mistake which has been made in taking away the cycle sections from the infantry battalions. In saying that I do not wish in the least to criticise or disparage the cyclist battalions. I entirely recognise the great value of cyclist battalions, but I think those who are connected with them do not recognise the immense value of the companies which belong to the infantry battalions. When I was in command of a battalion in South Africa I had charge on several occasions of a convoy of 300 waggons, and yet I had not a single mounted man. The fatal range of a bullet is one and a half miles, and of a field gun three miles, and yet I had to protect my flanks and to have an advance guard and rear guard without a single mounted man in the battalion whom I could send to deny the enemy the occupation of ground one and a half or three miles away on either flank. If I had mounted infantry or cyclists I could do it, but I could not do it with men on foot—that is an absolute certainty. Naturally the first thing one has to do in such case is to extemporise some mounted infantry or cyclists, so that you can protect your flanks. Allusion was made to the mounted infantry of the Inns of Court, which happens to be a battalion of the brigade I have the honour to command. Personally I consider the Inns of Court Cyclist Company is most efficient. They were always trained against the mounted infantry company; those two companies were always operating against each other, and I think those two bodies of mounted infantry and cyclists attained a high standard of efficiency, though I admit it is not the same standard of efficiency that the commanding officer of a Regular cyclist battalion might appreciate. Any comment upon the efficiency of the cyclists in that battalion I take as a reflection upon myself

as Brigadier. As to the power of cyclists being able to go across country, I attach no importance, although it may be useful on occasion. I appreciate the value of cyclists in many possible ways, but that is not one of them. I think the author has made a rather dangerous suggestion in asserting that cyclists are able to live on the country—that cyclists dashing about should go and rob the hen-roosts everywhere. I think that would be unfortunate for the troops that followed afterwards. As to the power of battalions of cyclists to make invasions, I think sixpennyworth of tin-tacks put down in each village would be very effective in stopping them. I distinctly believe in the very great importance of cyclists in the conduct of rear-guards. I absolutely believe in the many uses of cyclist battalions; I believe in their efficiency and value, I think even to a greater extent than is expressed by the lecturer, but I am not going to indicate all the points, because it might benefit those very inferior Germans whom we do not wish to benefit.

Lieut.-Colonel GILBERTSON SMITH, 25th Bn. (Cyclists), County of London:—I am afraid I stand here to-day as the upholder of the cyclist battalion against the cyclist company; but I must say that if all the cyclist companies which I have had the pleasure of meeting from time to time had been of the same efficiency and quality of training as Colonel Sturmy Cave's Hampshire battalion, there would be a great deal in what he says. My experience during the past twenty years has included cyclist companies, but unfortunately those cyclist companies in a good many cases did not come up to that standard of efficiency in training which they ought to possess. It is not their fault. As the lecturer has said, there was a great deal of difficulty in training the officers, who had themselves to train the men, and in my opinion the cyclist battalion is the only way to really and efficiently train the cyclist, inasmuch as if you get your officer young, as a subaltern, he goes through all ranks until finally as colonel of the battalion he is in a position to know exactly what kind of efficiency he ought to get from his men. At the same time, I should not be unwilling myself to see the cycle sections increased to a certain extent, provided there was any proper machinery for bringing those sections or companies together in a battalion, as suggested by Colonel Cave, on mobilisation. I would like to remind you that the whole essence of Mr. Haldane's scheme is that every unit should be properly equipped. If you are going to bring together six or eight cyclist companies and form them into a battalion, where is their quartermaster coming from, and where is their food coming from? They must have food; they cannot be expected to go about all over the country looking for that. Who is going to look after the ammunition? Who is to be their doctor? In other words, unless you arrange that the battalion when formed shall have an efficient staff, who in peace time are accustomed to work together, you are going to do more harm than good, any way to your own side, and benefit the enemy, because these men will have no one to look after their comforts and direct them generally. With regard to the remark that was made by Colonel Cave about the Salisbury manœuvres, I must maintain, with all deference to him, that at any rate on that side of the line on which I was operating the defects of the cyclist company system was very apparent. I do not want to go into details; I simply say that I did notice defects which I will tell him of if he cares to hear them. I maintain that the manœuvres which we had in East Yorkshire last year, where a battalion

together with certain attached companies carried on operations for a week, were far more successful, although possibly on a smaller scale than those held on Salisbury Plain in 1906. I attribute the success not to the fact that I was in command of the operations, but because those attached companies had the advantage of the organisation which the 26th Middlesex Battalion had been trained in for several years past. I cannot agree with the remarks Colonel Romilly has made about cyclists going across country. I know he has had the advantage of war experience and I have not, but from a cyclist's point of view I can quite bear out what the lecturer said, that the trained cyclist experiences no difficulty as a rule in getting across country. Then he threw out a suggestion with regard to tin-tacks. I am afraid they would not be considered at all by the trained cyclist, because he is accustomed, if necessary, not even to patch the tyre but to ride on the rim. Therefore the tin-tacks would not much upset him. There is one point on which I do not altogether agree with the lecturer, and that is, I think it is a very great pity that the bayonet has been done away with so far as the cyclist is concerned. The bayonet is not what it was in the days when I first joined the Volunteer Force, a very long weapon. It is now a very short one, and does not materially interfere with the cyclist. It is not a very great weight on his belt, and I must confess that I think it would be a very great advantage to him in meeting cavalry. There is no doubt about it that, so far as the Territorial Cyclist Battalions are concerned, they will have to meet the cavalry of foreign armies, and I personally think it would be a very great advantage to a man if he knew that if necessary he could slip off his cycle, detach his rifle, fix his bayonet, and then, in the language of the old infantry training, he is quite the equal of any mounted man in a single combat. The bayonet has been taken away; I do not know for what reason. I have found on many occasions in peace manœuvres that the bayonet would have been exceedingly useful to advance guards or scouts moving in advance, and I hope I may live to see the bayonet restored as a weapon to the military cyclist.

Colonel A. BROADWOOD, C.V.O., Commanding East Midland Brigade: —I do not wish to detain the meeting for more than a few minutes, but I rise as an officer who has for the last ten years had a very great deal to do with the Volunteers. I commanded a very large regimental district in Scotland, in which I had 7,000 men, and therefore I think I may say that I am greatly interested in this lecture. I thoroughly agree with what Colonel Cave said as to the companies being taken away from the battalions. I have been the Brigadier of many different brigades, and I have always found that my cyclists were of the greatest help in training my brigade. They were generally the keenest men in the battalions from which they came. That is especially the case in Scotland, where we had very good companies, particularly the Queen's Edinburgh, a corps of which you have no doubt all heard as one of the best shooting corps in the Volunteer Service. I think in warfare these cyclist companies should never be taken away from the Brigadier; they should be always under his command and used for his own purpose, and not as I gather is the plan now adopted, be massed together for other purposes. I think higher training would be very valuable in these cyclist battalions. I hope that in the future a school may be established through which officers and non-commissioned officers serving in cyclist companies can go and get a good training, like the School of Musketry or Signalling, or anything of that

sort. I think such a school should be established for cyclists, because they do exceedingly good work, and I know they have the keenest men among them. I have no doubt that the force is being trained better now, but at the same time, it seems to me that we should very much deprecate being deprived of the use of our brigade cyclists, or that they should be massed together away from the brigade, so that when we go into camp or manœuvres a body of cyclists is attached to us from cyclist battalions of whom, however efficient they may be, we practically know nothing.

Major R. A. JOHNSON (Brigade-Major South Midland Infantry Brigade):—I should like to add a humble word of hearty agreement with Colonel Romilly and Colonel Cave in their protest against what appears to so many of us to be the absolutely mad abolition of our invaluable brigade cyclist companies. But before doing so, may I say that I do not at all wish—quite the contrary—to depreciate the value of Colonel Gilbertson Smith's and Captain Trapmann's cyclist battalion. I have had many a good day with this battalion, and I know how thoroughly efficient it is. I have no hesitation in saying that, so far as cyclist work proper goes, there never was any body of cyclists who could hold a candle to the London Cyclist Corps. I desire to say that quite frankly and freely, because I do not want there to be any misunderstanding when I now proceed to attack what I may perhaps call excessive *esprit de velocipède*. It seems to me that what has just happened about military cycling in England is what has often happened before in our Army. We have here a distinct move, and so far a successful move, for the formation of a new arm. There are, of course, properly speaking only three real arms—infantry, cavalry, artillery, but from time to time we constantly see the arrival of what I may call a fourth wheel to the tricycle. I do not want to be very contentious, or to arouse passion in this Hall, but history of the mounted infantry movement illustrates the point I wish to make. Mounted infantry is extremely valuable when used properly, namely, in conjunction with infantry, exactly as the cyclist companies mounted on cycles were used by their infantry commanders. But as the mounted infantry rose in dignity and usefulness we saw a clear attempt, which has now, I am glad to think, been quashed, to form a new arm, cavalry, infantry, artillery, *and mounted infantry*, and a serious attempt to raise independent regiments of mounted infantry. I think this is exactly what has occurred with the cyclists. The cyclists felt, as the mounted infantry did, the disadvantage, as Colonel Gilbertson Smith has pointed out, of not being always free to develop on their own lines, of always being the handmaids of the infantry with which they are associated. And then grew up a demand among the enthusiastic for independence. A similar movement was made 150 years ago, which culminated in the formation of the Dragoons; there was this recent movement, which failed, to form mounted infantry regiments; and now comes this last instance of a declaration of independence by the cyclists, which has for the time succeeded. In other words, Colonel Gilbertson Smith and Captain Trapmann have persuaded the General Staff to deliver the cyclists from their inferior position as the bondsmen or handmaids of the infantry, and to exalt them into something very magnificent, very grand, and very admirable—eleven cyclist battalions, to wit, with the special and honourable duty of being the first to speak—and speak alone—with our enemies in the gate. Referring to what Colonel Romilly said about his South African experience, I should rather like to dot the i's of what he told you, because I happen

to have had the honour of serving under him on the few occasions on which he was permitted to have a few mounted troops. As he told you, he very often was without a single mounted man, and the result was that he had to extemporise them. I well remember some gallant Scots Guards who were mounted on horses and dignified in the Army List by the name of "Tempest's Scouts." General Barrington Campbell, who commanded the brigade in question, did not believe in these extemporised Guardsmen; he said he did not want his Guardsmen riding all over the country mounted on horses and looking for all the world like monkeys on sticks; and in my opinion General Barrington Campbell was perfectly right. The proper solution would have been for each Guards battalion to have had with them permanently and in peace time a certain proportion of men who could ride either bicycles or horses, but who were always members of their battalion and under the orders of the battalion commander, not waiting till war came to be formed into a scratch team and receive the dignity of a separate entity and the name of Tempest's or anybody else's Scouts. Our argument applies with equal force to the cyclists. Cyclist battalions have been formed as superior beings altogether apart from the infantry, with their own *esprit de corps*, their own traditions, and their own "monkey tricks," of which Captain Trapmann is so proud, showing a fine contempt for all the other arms of the Service and a remarkably good opinion of themselves. This is all very well in peace time, but what will happen on mobilisation for war? Why, of course we shall have the infantry brigadiers calling out for a proportion of cyclists, and Colonel Gilbertson Smith's gallant battalion will be broken up into little bits and allotted to the various brigades of the London Division. They certainly will not have the advantage of serving under Colonel Gilbertson Smith or Captain Trapmann. Both of those officers will probably be relegated to duties of Station Staff Officers, just as the colonels commanding the artillery brigades were in South Africa. At such time many special military talents will be entirely wasted, which will be a thousand pities, as they would be most valuable officers if they could bring themselves to place their knowledge of cyclist work at the disposal of the infantry brigades. Why, in the name of goodness, should we take such care to separate and train permanently away from the other arms cyclists who admittedly when war comes will be redistributed to the units, and who will then be strangers to those units, with bickering and ill-feeling as the inevitable consequence? If every brigade of infantry must in war time have its proportion of cyclists, why should not the cyclists always be trained with the brigades, so that infantry and cyclists may be accustomed to each other when they have to take the field together in war? I see no reason or justice in the argument that if you take the scattered cyclist companies of a brigade and put them together every year as a cyclist battalion as the occasion arises, and send them sixty miles to seize some position, and so forth, in accordance with what I may call the strategical uses of cyclists, it is impossible to provide such a force when on detached duty with a quartermaster, a medical officer and the rest. Surely the independence of such a detached force can easily be arranged for. We all admit that for training purposes it is very much better that there should be a major or a colonel commanding four companies of cyclists. It is admitted that it is a most valuable thing that these four companies of cyclists should be trained to act together and should be able to take the field together as an independent force for a day or two without having to draw upon other units for transport and supply, etc. Now, if you have one company of cyclists to each battalion,

that gives you a battalion of four companies to each brigade. Let that battalion be accustomed to make excursions away from the infantry brigade for a day or two at a time; let them have their own quartermaster and their own medical officer, and above all their own separate transport; they will then serve the double purpose—the strategical purpose of making excursions away from the infantry whom they serve, and they will not at the same time deprive us of what certainly seems to me to be their most valuable purpose, that of being handmaids—a glorious service, although no doubt a secondary service—to the infantry; the eyes and ears of the infantry C.O., the darlings of the infantry brigadier and the infantry divisional general—the people who are sleepless by night and by day, who can bear any amount of fatigue, cover any amount of distance, live on very little indeed, and who, although perhaps worn to attrition during the course of a campaign, will at least have served this purpose: that they keep the infantry quiet and intact for the great day of battle. I have only to add that I have had a good deal of experience with cyclist work on peace manœuvres, and, interesting and valuable as it is, heaven defend me from ever having to lead one thousand cyclists in a pitched battle. Our business as cyclists is that of being the eyes and ears of the army, to wear ourselves to skin and bone, to do the scouting and the screening; but if you intend to put me in actual line of battle with a thousand bicycles to look after—it may be the fact that I have never been trained in a cyclist battalion, or it may be my tactical good sense—I would rather leave the cycle behind and be a plain infantryman in a plain, straightforward infantry fight. In conclusion, we infantrymen have no objection—if it seems good to the General Staff—to the raising of special cyclist battalions for special duties in coast defence, but we do protest as strongly as we dare against the tactical heresies which have prompted the extinction of the cyclist companies and sections, which we know to be invaluable, in order to find the funds for the creation of a fourth arm, the value of which is at least problematical. My genuine admiration of the General Staff and for most of what they are doing for the Army is so great that I have no hesitation in giving it as my opinion, for what it may be worth, that in depriving the infantry brigadiers of their cyclists, the General Staff have made a big tactical blunder, the results of which, when war comes, if not before, they will hasten, perhaps when it is too late, to undo.

Lieut.-Colonel H. Woolf (Transvaal Cyclist Corps):—It was far from my intention to join in the discussion to-day, and I therefore made no notes while the paper was being read. The discussion seems to have concerned itself, so far as I have been able to gather, with the question as to whether cyclists should be included in the infantry battalions, as in times gone by, or whether they should be separate units. There are no doubt pros and cons to be considered in connection with each suggestion. For over three years I was captain of a company of cyclists which was attached to the Transvaal Scottish Infantry in the Transvaal, and after that I formed, and to-day have the honour of commanding, a regiment of cyclists. The difficulty when we are joined to the company is one which has already been stated, that the commanding officers neither appreciate the proper uses to which the cyclist should be put, nor do they know, when it comes to field day or camp, or anything of that kind, what to do with them. We were invariably utilised either as scouts or despatch riders or something of that kind, and I do not think we were put to the legitimate uses to which we were entitled. On the other hand, for four

or five years my experience has been that whenever any quick work had to be done, whenever there was an important position to be taken, and whenever there was any night work or anything that required a certain amount of discrimination and at the same time despatch, we, as cyclists, were invariably selected for that work. The reason, I take it, was that in the first place I had always had the men trained thoroughly as infantry before ever they were taught to mount a cycle, or at any rate, to make a raid on a cycle. They thoroughly understood how to use their rifles, and latterly how to use their bayonets. The consequence was that we first had a trained soldier in the ordinary accepted sense of the term. Then when we came into action we were always placed either on one flank or the other, as the case may be, and it invariably happened that we not only outflanked those to whom we were opposed, but we were able to get entirely in their rear and prevent them from retiring when they desired to do so; we had them entirely rolled up, as it were, in a bag. I am, therefore, of opinion that while it is desirable that the infantry regiments should be served by cyclists, not as a company but in a limited number, yet I maintain that if the cyclists are properly utilised, there is no question as to their utility in actual times of stress. As has been so carefully explained to you by Captain Trapmann, when it is needed we can move infinitely more rapidly than the cavalry, and at the same time we are comparatively fresh at the end of the work, provided it has not been too severe, and that we have not, as we often have to do in the Transvaal, to move too long a distance over the veldt, which is exceedingly hard work. It is somewhat late now, and while a good deal more could be said in connection with this subject, I do not think it is wise to weary you by going into any more details. I hope, however, an opportunity will be given before I return, at the end of January or February, whereby this subject, which is open to a great deal of discussion, may be further ventilated.

Major J. M. Besant, Brigade-Major, Norfolk and Suffolk Brigade:—In order to obviate prejudices of other branches of the Service against this, the youngest, excrescence, it is perhaps necessary to constantly define its functions clearly, and to show that its existence does not encroach upon or interfere with their functions, but fits in with them. The first, and to my mind the most important, duty of cyclist units is that of observation, combined with defence, of all assailable parts of our coast line, assisted by the local Coastguards, ex-Coastguards, fishermen, and any who can be found capable and willing. On the very first alarm (the *personnel* of cyclist battalions being already detailed for their coast war posts), it should be possible by a simple scheme, of which I have collected details, to assemble those units at their posts within a few hours, and to maintain them there if necessary for at least 14 days without camp equipment or commissariat, and with a minimum of motor transport. This transport should provide for such services as supply of ammunition, repairs, medical aid, and transport of staff. Superior mobility being the prominent feature of the cyclist soldier enables him to mobilise and to concentrate very quickly. In coast work their principal duties are to harass and delay a landing or an advance inland, if not to prevent it, and to gain time, so valuable for the general mobilisation. No more favourable opportunity for this is likely to occur than if an enemy crowded in boats were opposed by some hundreds of riflemen posted under cover near a shore line. To take full advantage of this opportunity it is the duty of cyclist battalions to have a thorough knowledge of the coast

lines allotted to them, which can only be gained by constant study of them and local training annually. I speak only of experience gained in the county of Norfolk during the past eight years. Chapters III. and VII. of "Cyclist Training" give general ideas of this work. General Sir Arthur Wynne gave the Norfolk cyclists their first opportunity of testing their powers of concentration to oppose a landing. An attacking force was represented by two gun boats. Some 40 miles of coast was the defined object on which their attack might be delivered at any point. The point of attack was discovered, and the concentration of threequarters of the force of cyclists was effected twenty minutes before the boats of the attacking force could have got ashore. The movements and position of the cyclists were quite unknown to those on board the gun boats. For watching a coast line by night, I have, in consultation with local Coastguards and fishermen, arrived at the conclusion that another system should be adopted, details of which I had better not go into now. As regards the tactical employment of cyclists and their use with cavalry, I think the remarks of the lecturer are valuable as a guide to further training. It is well to remember that the action of cyclists as a rule is locally defensive. In 1904-1905, the cycle companies in Norfolk were trained under mounted infantry officers, from which they derived great benefit. I do not quite agree with the suggestion that the intervals and distances on the march be decreased. The speed at which cyclists can close up should counteract the disadvantages urged. Also with the larger intervals, bodies of cyclists can move more safely and at a higher speed. Referring to the comparative value of our Territorial soldiers to that of foreign conscript soldiers, it is not in the ranks that the balance lies against us, so much as in the superior discipline and science of the commissioned and non-commissioned ranks. I believe the motor cyclist for general purposes to be the best means in this country for communication in the field. Whatever the training of the cyclist soldier is, it should essentially be framed to work in with that of all other branches of the Service; but I maintain that the first and most important duty for which they have been called into existence, is on the coast—to harass and delay an enemy, and so gain time for the mobilisation of all for defence.

Captain A. H. TRAPMANN, in reply, said:—Those who have addressed the meeting have, I think, instead of criticising my lecture, rather contented themselves with criticising the action of the General Staff in abolishing cyclist companies. I believe Major Johnson imputed to me that I had induced the General Staff to do so. I plead: Not Guilty. As there appears to be no member of the General Staff present who wishes to defend them, I, having no brief for the General Staff, can therefore say nothing. We must take the fact as we find it. I thoroughly agree with all the speakers who have referred to the subject, and hope that in a year or two we shall have not only cyclist battalions, but cyclist companies. A beginning had to be made somewhere, however, in the Territorial Army, and if we have not got money for both, we must for the present be content with the battalions. The General Staff thought they had sufficient work to do for at any rate ten cyclist battalions. They may, of course, be totally wrong—I do not know; but it is to be presumed they had work for them, and they therefore created them. They thought they had not got any work for cyclist companies at present, so they have left them uncreated. As I say, it is not a question for me to discuss at all. There is one other point I should like to draw attention

to. I should be extremely sorry if Colonel Romilly took my remarks as any sort of criticism of the troops in his brigade. I think he could not have heard me correctly, or that he misunderstood my meaning. The only reference in the paper to the Inns of Court (who, by the way, are very old comrades of ours), was with regard to the old 26th Middlesex; I said that the 26th Middlesex were not included in the C.I.V. Cyclist Section, because that Cyclist Section was formed from the Inns of Court V.R.C. I do not know how any aspersion upon the Inns of Court could be read into that. I should think that, considering they were selected to form the Cyclist Section of the C.I.V., it would hardly be possible to do them a greater honour.

Colonel ROMILLY:—That, I may say, was meant for a joke.

Captain TRAPMANN:—As regards the question of tin-tacks, as my commanding officer said, a trained cyclist can quite well ride on the rims of the bicycle. That reduces his pace about two miles an hour, or, if they are really scorching, about four miles an hour. You cannot expect a man to do twenty miles an hour on flat rims. But a trained cyclist does not merely mean that he is trained to scorch—he is trained to do everything. There is one paragraph in "Infantry Training" which refers to ground scouts. Cyclists also attend to these little things. We have ground scouts as well as other things, and it is a common thing for well-trained cyclists to have to deal with tin-tacks. One of the men simply holds up his hand and says: "'Ware tin-tacks."

Colonel ROMILLY:—At night?

Captain TRAPMANN:—Yes; you can hear your tyre bursting at night as well as in the daytime. Even when they are passing over broken glass you will see the files moving off to the right or to the left. I think it is only fair to give cyclist battalions credit for having ground scouts sufficiently trained to warn their comrades that tin-tacks have been thrown on a certain section of the road. If the ground scouts of any company I was in charge of told me that several tons of tin-tacks had been strewn on a certain section of road, I should merely go through the hedge and ride the next half mile on the fields, and come out on the other side.

Colonel ROMILLY:—I said "every village," but it was said as a joke.

The CHAIRMAN (Brigadier-General Sir H. S. Rawlinson, Bart., C.V.O., C.B.:—It rests with me to sum up the very interesting discussion we have had this afternoon, and perhaps to some extent to pour a little oil upon the troubled waters. I do not know that I am very competent to deal with the subject of cycling, though I learned to ride a bicycle a great many years ago, I think in 1875, when I was a boy at Eton, and I have ridden a good many thousand miles since then. Perhaps I am not quite qualified to be considered a really "trained soldier cyclist," but at the same time I have seen a certain amount of cycling work, and various points have been raised to-day with which I cannot thoroughly agree. The discussion has turned mainly on the question as to whether cyclists of the Territorial Army should be trained by battalions or by companies. The organisation which the General Staff have laid down as most suitable at the present time is that of battalions, and I think they have done so for a specific purpose. The Territorial Army, as created by Mr. Haldane, has been initiated for home defence, and I gather that

these cyclist battalions have been formed at certain selected centres for the purpose of moving rapidly to dangerous points upon the coast, with a view to defending those points at the very earliest possible moment in case of danger. I know I am right in saying that that is the reason the cyclists of the Territorial Army have, for the present, been organised into battalions. I do not say that that is necessarily the best arrangement, because from the experience I have had in working a brigade of infantry, I look upon a limited number of cyclists with the brigade as indispensable. I am not sure that a company is not perhaps too many, but I am sure that, in so far as the brigade organisation goes—and we are all organised into brigades—a certain number of cyclists are absolutely necessary as the eyes and ears of that force. I would especially lay stress upon what fell, I think, from Major Johnson, that the cyclist, however enthusiastic he may be—and really if the cyclist is to do all the lecturer claims for him he must be an Admirable Crichton—however expert he may be, both in fighting, shooting, reconnoitring, and everything else, he must recognise that he is merely an auxiliary either to the infantry or the cavalry. Both from a tactical and an organisation point of view the cyclist cannot be a fourth arm. The infantry is the backbone of a military force. It is the infantry that wins your battles. The artillery is there to help the infantry, the cavalry is there to protect the infantry and obtain all the information possible; but it is your infantry, and your infantry alone, that wins decisive success, and the cyclist as an assistant to that infantry is certainly a very valuable adjunct. There is one small point which curiously enough has not been brought out with regard to the cycle, and that is that the cycle does not eat. For this reason the cycle is particularly useful in over-sea expeditions, especially with a force that has to land on an open beach, where horses cannot be put ashore, and where the supply of grain for animals is limited. In such cases cyclists would have to take the place of mounted troops, and might be of very great value. It is getting late, so I will not refer to several other points to which I should have liked to call attention, except this last one. It has been suggested that cyclists may take the place of outposts. I should be very sorry indeed in war to trust to a few standing patrols of cyclists pushed out at long distances in front of a camp or bivouac. I know too well how liable standing patrols are to surprise, and in the event of surprise how impossible it is for anyone, even a motor cyclist, as the lecturer suggested, to get away and give the alarm. If once one of those standing patrols is surrounded and captured—and this is by no means a difficult operation—there is nothing to prevent the enemy walking straight into your camp without any notice at all. Hence I strongly deprecate their use instead of outposts, though they may be of great use particularly at night as message-carriers and for reconnaissance. I would like, on your behalf, to propose a vote of thanks to Captain Trapmann for his extremely interesting and very elaborate lecture.

TURBINES OR MOTORS IN SHIPS?

Translated from *Nauticus*, 1908, and reproduced by permission of the Editor of that publication.

Communicated by the Director of Naval Intelligence.

WE are still at the commencement of the great revolution which the introduction of the steam-turbine as the motive power of ships is effecting in the domain of shipbuilding and engine construction, yet already we hear it stated that the steam-turbine is only of transitory importance, and that the motive power of the future will be the internal combustion engine, either motors or gas-turbines.

The object of this article is to compare the advantages and disadvantages of these two methods of propulsion in the present position of engineering science, and afterwards to come to a conclusion as to the possibility of their further development.

With this aim their present state of development will first be considered.

THE DEVELOPMENT OF THE STEAM-TURBINE.

The development of the steam-turbine has undoubtedly made important progress since the appearance of last year's *Nauticus*. But this development has, as earlier, been rather quantitative than qualitative. A series of fundamental problems, such as economical working at reduced speeds, manœuvring powers of ships fitted with turbines, and the question of suitable propellers for a high number of revolutions, which is intimately connected with both the foregoing, have indeed been successfully studied, but they still await a completely satisfactory solution.

With some few exceptions, the Parsons turbine still leads the way. The following table[1] contains a summary of the ships fitted with this type of turbine, and enables us to see to what extent its employment has again increased as compared with the previous year:—

——	Number.	Horse-power.
Merchant vessels	58	613,600
Yachts...	9	27,400
Warships (including torpedo boats)	104	1,311,750
Total	171	1,952,750

[1] From a publication of the German Parsons-Turbine Company.

In the previous year the figures were 120 ships with a total H.P. of over 1,300,000.

Although up to the present the Parsons turbine has defied competition, thanks especially to the greater perfection it has attained during a developing period of ten years, other types are now beginning to attract attention, and have already some successes to record.

In view of the subsequent discussion of the parallel experiments with different types in the German and United States Navies, it will not be out of place to here briefly point out the distinguishing features of the various systems and to indicate their advantages and disadvantages. It will suffice to examine only those types which come into consideration for the propulsion of ships.

As is well known, steam-turbines are divided into two groups, reaction (superpressure) turbines and impulse (equal-pressure) turbines, according to whether the conversion of the steam pressure into kinetic energy takes place in the fixed and moving blades or only in the guiding apparatus. In the latter case nozzles constitute the principal guiding apparatus, in the former case rings of blades similar to those of the running wheels. When nozzles are utilised they only extend round a portion of the periphery of the wheels; when guide-blades are employed they generally extend all the way round.

The Parsons Turbine.

The Parsons turbine is a reaction turbine. Its rings of moving blades are arranged on a drum; its fixed blades are fitted to the casing. It utilises the expansive property of the steam in a large number of pressure-stages, which are not separated from one another by partitions of any kind. As the pressure before and after a ring of moving blades is different, the clearance between the blades and the casing must be small in order to allow as little steam as possible to pass unutilised. This small clearance is specially dangerous in the high-pressure portion, because the expansion of the blades in consequence of the high steam temperature is the greatest there. On the other hand, every increase in the clearance in the high-pressure portion, on account of the great differences in pressure, results in serious losses, especially as here, in consequence of the full expansion necessary with reaction turbines, the blades are very small and the clearance is considerable in proportion to them.

The high pressure portion is, therefore, the weak point of the Parsons' turbine. On the other hand, the efficiency of the low pressure portion is very high; in it the expansive property of the steam, which is led through numerous pressure-stages, is utilised in the most favourable manner conceivable.

All other turbine systems—partly with reaction-blading, partly with impulse-blading—at present coming into consideration for marine work, have, therefore, adopted this arrangement

of the low pressure portion, even those which were originally constructed as land turbines of the impulse type with few pressure-stages. This latter arrangement has only been retained in the Curtis turbine, as fitted on board the *Salem* (see p. 332) and *Creole* (see p. 340).

The method of placing the high pressure and low pressure turbines on different shafts, as well as that of installing cruising turbines, with a view to economical steam consumption at slow speeds, may be assumed to be known (see *Nauticus*, 1906).

The Melms and Pfenninger Turbine.

Of the combined systems, that of Melms and Pfenninger is the most similar to the Parsons turbine, of which it is a development. Its low-pressure portion is exactly the same; only the high-pressure portion is different, being constructed as an impulse turbine with few pressure-stages. In the first stages of the high-pressure portion, the steam is only led on to portions of the periphery. In contrast to other impulse turbines, however, there are no nozzles in the high-pressure portion; it is the only turbine besides the Parsons that is wholly without nozzles.

The high-pressure portion of the Melms and Pfenninger turbine is naturally considerably shorter than that of the Parsons.

It is with good reason that attention is being given to the performances of this turbine in ships, as it unites in a most admirable manner the recognised advantages of the Parsons turbine with those of the impulse turbine. It will be tested in our Navy, as mentioned below (p. 335), in a few torpedo boats, and—perhaps in a somewhat different form—in a small cruiser.

The A.E.G. Turbine.

The A.E.G. (Allgemeine Elektrizitäts Gesellschaft) turbine in its high-pressure portion is similar to the American Curtis turbine, in its low-pressure portion to the Parsons turbine, but here also it has impulse-blading.

For high powers, the high-pressure and low-pressure turbines are placed in separate casings. In the high-pressure portion, nozzles serve as the guiding apparatus, in the low-pressure portion, blades.

The high-pressure stages are separated from one another by diaphragms, which are fitted to the shaft by means of white-metal rings. In these diaphragms there are intermediate conical nozzles. In the high-pressure stages the nozzles only extend round a portion of the periphery; the number is gradually increased until the low-pressure stages are reached, where they extend all the way round. Every pressure-stage in the high-pressure portion has from 3 to 4 speed-stages; the steam-velocity produced in the nozzles is therefore used up in several stages.

For low powers the astern-turbine has only a few pressure-stages. For greater powers it is, like the go-ahead turbine, divided into a high-pressure and a low-pressure portion. It is placed in the low-pressure casing.

In order to attain an economical steam consumption at low (cruising) speeds, nozzles were abolished at the first high-pressure stage in the first installation on the turbine-steamer *Kaiser*. This arrangement did not meet with the desired success (see *Nauticus*, 1906). In a later installation, part of the turbine is disconnected for cruising speeds, and the highest efficiency is obtained by the unexpanded steam being led into one of the later high-pressure stages. This arrangement for increasing the efficiency has already been made use of by Parsons in a somewhat different form, in land-turbines as well as in marine-turbines. He leads the unexpanded steam direct to a later stage, whilst in the A.E.G.-turbine the unexpanded steam passes through the nozzles and blades of the first stage.

The Zoelly Turbine.

The Zoelly marine-turbine is very similar in its construction to the above-described A.E.G.-turbine. The number of its pressure-stages in the high-pressure portion is greater, but each pressure-stage is only divided into two speed-stages. The nozzles have a cylindrical instead of a conical mouthpiece.

The Curtis Turbine.

The Curtis turbine, as mentioned above, is the only one in which, for marine purposes, the division of the low-pressure portion into numerous pressure-stages has not, up to the present, been carried out. In considering the turbine steam-ship *Creole*, further details regarding this type of turbine will be given.

Naval Participation in the Development of Turbines.

England.

Of the greater maritime Powers, England can claim the main share in the development of the steam-turbine as the motive power of ships, and her Navy, on account of the recognised military advantages of this type of engine, has led the way by deciding to equip its vessels with turbines only.

As turbines are specially advantageous for fast ships of high power, there are some striking results to be recorded which have been achieved by vessels of this type.

The five destroyers—*Afridi*, *Cossack*, *Ghurka*, *Mohawk*, and *Tartar*—of the latest British type, the so-called tribal class, have completed their trials, the four last-named boats at the end of last year; the high speed of 33 knots on a 6-hour trial, which was required by the contracts, was considerably exceeded. The boats, described in the 1906 and 1907 Year Books, are of about

800 tons, and are equipped with Parsons turbines of about 16,500-H.P. The *Cossack* and *Ghurka* have 5, and the *Mohawk* and *Tartar* 6 small-tube boilers; they burn oil fuel and carry a supply of 150 tons, their radius of action being 1,500 miles at 13 knots. The engines consist of 5 go-ahead and 2 astern turbines, which are placed on 3 shafts with 1 propeller on each. On the centre shaft is the high-pressure turbine, and on each of the side shafts, a low-pressure, a cruising and an astern turbine. The two cruising turbines are connected in series. This arrangement is the most suitable for various cruising speeds.

The table given in the article on the progress of foreign navies (page 75 of *Nauticus*), shows the speeds attained by the individual boats, from which it will be seen that the *Tartar* stands out prominently with a maximum speed of 37·037 knots.

It must not, however, be forgotten that these results were obtained with less than the full load displacement, and with a specially-trained yard personnel. Nevertheless, they could scarcely have been obtained with reciprocating engines. The average speed maintained during the 6-hour run on the measured mile is specially to be noticed.

The oil consumption is said to have been very favourable, and the contract figure of 1 lb. per square foot of heating surface to have been considerably improved on.

The great engine-power and speed of these boats will, however, be considerably surpassed by the experimental destroyer *Swift* (see *Nauticus* for 1906 and 1907), which, with a displacement of 1,829 tons and engines of 30,000-H.P., is to have a speed of 36 knots. There will be 4 propeller shafts with 4 turbine sets, arranged similarly to those of the *Lusitania* and *Mauretania*. Steam will be supplied from 12 boilers; the fuel used will be oil. Whether further vessels of this type are constructed will depend on the results of the trials. It will probably remain merely a speed experiment, as its cost is out of all proportion to its military value.

As is well known, the so-called first-class torpedo boats, whose latest representatives have displacements of 255-285 tons, engines of about 4,000-H.P., and speeds of about 26 knots, are fitted with Parsons turbines and for oil fuel.

Whilst all the great naval Powers have adopted, or are about to adopt, turbines as the motive power of torpedo boats, England alone has introduced this type of engine in all her new large ships.

Details of the trial of the *Dreadnought* were given in last year's *Nauticus* (pages 70-71 and 463, *et seq.*). The few authentic reports which have since become public have generally confirmed the statements there made and the conclusions arrived at.

In order to remedy the considerable reduction in the speed which occurred at the commencement of the first commission, as compared with the results obtained during her trials, and

which, according to some reports, was as much as 1·75 knots, two new forms of propeller were tried. Their dimensions and the results obtained, as taken from English technical publications, and similar figures for the first propellers, are given below.

The information available unfortunately does not state definitely whether the desired result was obtained; moreover, it cannot be ascertained whether the trials were carried out with the maximum draught of 30·5 feet.

The statement in the English technical Press that the *Dreadnought* has a sea-going speed about 3 knots greater than any of the other recently constructed battleships does not help us to any very reliable conclusions.

Propellers.	Diameter.	Pitch.	Blade-surface.	H.P.	Speed.	Revolutions.	Slip.
	feet.	feet.	sq. feet.		knots.		per cent
1st Form...	8·8	8·2	33·3	27,518	21·6	337·3	22·4
2nd Form	—	8·2	inner blades, 39·8 outer blades, 28	26,400	20·7	330	24
3rd Form	·99 ft. longer and ·56 ft. wider than the 2nd form.			greater than either of the previous			

In any case the English Admiralty appears to be satisfied with the results obtained with the Parsons turbines of the *Dreadnought*, as they are having this type installed not only on board the battleships of the *Bellerophon* class, as stated in last year's *Nauticus*, but also on board the ships of the *St. Vincent* class, which are of still greater displacement and engine-power (19,559 tons, 24,500-H.P., 21 knots). In addition, as is generally known, the 3 armoured cruisers, *Invincible*, *Inflexible*, and *Indomitable*, of 17,527 tons, 25 knots speed, and 41,000-H.P., have been fitted with Parsons turbines. The *Indomitable* has already commenced her trials, and has considerably exceeded the contract speed.

France.

The French Navy is following the example of England and equipping her battleships with turbines. As reported last year, the 6 battleships of the *Danton* type, of 18,350 tons displacement, 19·25 knots speed, and 22,500-H.P., will all be supplied with Parsons turbines.

In two 400-ton torpedo boats an experiment already made some time ago will be repeated—the *Tirailleur* and *Voltigeur* will each receive two Bréguet or Rateau turbines and a reciprocating engine. The sister-boat *Chasseur* is fitted with Parsons turbines.

Italy.

The Italian armoured cruiser *San Marco*, now under construction, is to have steam turbines, with which a speed of 23 knots with 20,000-H.P. is to be obtained; her sister-ship, the *San Giorgio*, equipped with reciprocating engines, is, however, only estimated to have a speed of 22·5 knots with 18,000-H.P.

Austria-Hungary.

The turbine-cruiser of the Austro-Hungarian Navy, the *Admiral Spaun*, referred to in last year's *Nauticus*, will have, on a displacement of 3,500 tons, engines of 20,000-H.P., and an estimated speed of 26 knots.

The engine installation consists of 6 Parsons turbines; a low-pressure turbine and an astern-turbine are placed on each of the two inner shafts, and a high-pressure turbine on each of the two outer shafts. Each of the 4 shafts carries one propeller. The turbines are being constructed by the Stabilimento Tecnico at Trieste.

United States.

Of the two American turbine-cruisers *Chester* and *Salem* (3,810 tons, 16,000-H.P.) described last year, the first, which is equipped with Parsons turbines, recently commenced her trials; on a 4-hour run an average speed of 26·53 knots was attained, that is, 2·5 knots more than the contract speed. The maximum speed was 26·6 knots; a very uniform speed was, therefore, maintained during the run.

During the 24-hour run at an average speed of 22·8 knots, the ship steamed 2·824 knots per ton of coal consumed; only 1·8 knots per ton, at a speed of 22·5 knots were, however, required by the contract. During the 24-hour run at a speed of 12 knots, 6·67 knots were steamed per ton of coal consumed. The ship has, therefore, at 23 knots a radius of action of 4,000 knots, and at 12 knots one of 14,000.

The similar cruiser *Birmingham*, fitted with reciprocating engines for purposes of comparison, on a 4-hour run attained a maximum speed of only 24·32 knots, and on a 24-hour run a maximum of 22·665 knots. On this 24-hour run, only 2·48 knots were steamed per ton of coal consumed, and on the 24-hour run at 12 knots only 5·96 knots per ton.

A comparison of the maximum number of revolutions is also interesting; in the case of the *Chester* it was about 350, and in the case of the *Birmingham* about 190.

The *Salem*, which is equipped with Curtis turbines, and whose shafts at full speed are to make about 250 revolutions per minute, will commence her trials in the summer.

Although the results of the comparative trials of the *Salem* and *Chester* are awaited before the equipping of battleships with turbines is finally settled, it was last summer decided to instal Curtis turbines in one of the 20,000-ton battleships, namely, the

North Dakota. This decision was largely influenced by the results obtained with this type of turbine, in the case of the s.s. *Creole* (see p. 339) of 10,000 tons and 8,000-H.P. Like this vessel, the *North Dakota* will only have 2 sets of turbines working on 2 shafts. This arrangement, which is rendered possible by the shortness of the turbines, undoubtedly has numerous advantages as compared with the much-divided Parsons turbines, especially as regards the simplicity of their working. It is also to be expected that the two large propellers will give the ship a better manœuvring power than that obtained with the four smaller propellers of the *Dreadnought*. It is, of course, questionable what will be the working efficiency of these propellers. It should be more favourable, provided the number of revolutions can, without prejudicing the thermic efficiency of the turbine, be lowered sufficiently for the periphery-speed of the propellers not to be too high.

In any case, the results of this experiment will be studied with the greatest interest, as they may be of great importance with regard to the question of turbines in battleships.

Japan.

The Japanese Navy is also taking great interest in the Curtis turbine. The information given last year that the battleship *Aki* of 19,780 tons and 20 knots speed, was to be equipped with turbines of this type of 25,000-H.P. is confirmed, as among those now under construction in the Fore River Shipbuilding Co.'s Yard at Quincy, Mass., are two double sets for the Japanese Navy; the second set of these turbines is intended for the armoured cruiser *Ibuki*, of about 14,800 tons.

The despatch vessel *Mogami* (1,350 tons, 8,000-H.P., 23 knots) is to have Parsons turbines.

Germany.

Of the vessels of the German Navy fitted with turbines, torpedo boat *G 137* and the small cruiser *Stettin* have completed their trials during the past year; they were completely successful in each case, and show a considerable improvement as compared with those of torpedo boat *S 125* and the small cruiser *Lübeck*.

On the measured mile at Neukrug *G 137* attained a maximum speed of 33·96 knots, and on the 3-hour run with forced draught, an average speed of 33·08 knots, with a mean displacement of 576 tons. Only 30 knots were guaranteed, with a displacement of 571 tons. Going astern, a speed of 16·9 knots was attained, whilst only 15 knots were required.

The placing of the turbines in two separate engine rooms[1] has proved satisfactory. With the turbines of one engine room, the boat runs at a speed of 22-23 knots.

The coal consumption during the 3-hour run with forced draught was about 2 tons per hour higher than in the case of the

[1]See *Nauticus*, 1907, p. 462.

30-knot boats fitted with reciprocating engines, which are of about 40 tons smaller displacement. The increase of 3 knots in the speed was not too dearly bought. At 17 knots the increase in the coal consumption amounted to only 25 per cent., whilst in the case of *S 125* it amounted to 53 per cent.[1]

The trials of the cruiser *Stettin*, although carried out during the winter months under most unfavourable weather conditions, also resulted very favourably.

On the delivery trial, during two runs over a 14-mile course near Bornholm, a speed of 25·77 knots was attained. This was not, however, with the trial-draught required by the regulations, so that the later results were not quite so good.

During four double runs over the deep-sea measured mile near Neukrug, with about 21,600-H.P., 584 revolutions per minute and 3,410 tons displacement, a speed of 25·17 knots was obtained. A mean speed of 23·96 knots was attained during a 6-hour run with the same displacement, 524 revolutions and 15,448-H.P., the air pressure in the fire boxes being considerably lower. The mean speed during 3¼ hours was 24 knots.

During the 24-hour full-speed run, with a mean speed of 20·2 knots, 415 revolutions per minute and about 7,000-H.P., the mean coal consumption was about 5·9 tons per hour for the turbine installation alone.

The average figures for a 24-hour coal-consumption trial at 12 knots were 1,334-H.P., 243 revolutions per minute, and a coal consumption of 1·788 tons per hour for the turbines alone. During another 24-hour run at the same speed, with 243 revolutions per minute and 1,403-H.P., only 1·564 tons per hour were consumed.

The average figures given by the coal-consumption trial at 17 knots were 244 revolutions per minute, 4,195-H.P., and 3·838 tons of coal per hour for the turbines alone.

The coal consumptions are all below those required by the contract—mostly about 7 per cent. They approximate to those obtained with the sister-ship *Königsberg*, fitted with reciprocating engines. As in the case of the latter, the coal consumption increases with the wear of the engines, the turbine-ship will in the end be more economical.

The times and distances in which the *Stettin* was brought to a standstill with the astern-turbines working at full power are given in the following table:—

Number of boilers.	Speed in Knots.	Distance in feet.	Time.
11	24	1,410	1′ 7″
11	20	1,190	1′ 6·5″
8	16	770	1′ 3′
6	11	590	57″
5	9	500	57·5″
3	5	260	56·5″

[1]See *Nauticus*, 1906, p. 462.

From the still position, with three boilers, the previous speed ahead was resumed in 5 minutes 36 seconds, that astern in 6 minutes 30·5 seconds; with 6 boilers, the previous speed ahead was resumed in 4 minutes 39 seconds, that astern in 4 minutes 50·5 seconds.

From these results the ship is, as regards manœuvring power, also fully equal to her sister-ship equipped with reciprocating engines.

The vibration was not noticeable even at a speed of 25 knots.

Whilst in the turbine vessels of the German Navy tested up to the present (*S125*, *G137*, *Lübeck*, and *Stettin*), turbines of the Parsons type alone have been fitted, on the following new vessels other types are being introduced for purposes of comparison.

Of the *V* series of torpedo boats now under construction at the Vulcan Yard, *V161* will have A.E.G.-Curtis turbines; the others are being equipped with reciprocating engines. The A.E.G.-Curtis turbine will also be fitted in three boats of the next series.

The Krupp Germania Yard will supply four boats of its next series with Parsons turbines, as in *G137*, and one boat with Zoelly turbines.

The Schichau firm has concluded an agreement with Melms and Pfenninger, and will equip its next series (four boats) with turbines of this type, which is very similar to the Parsons turbine.

Of the small cruisers, the *Dresden* will receive Parsons turbines, which will, however, be made by her constructors, Messrs. Blohm and Voss. The *Ersatz Jagd* is being fitted with A.E.G.-Curtis turbines at the Vulcan yard. Shichau will supply the *Ersatz Greif* with either Melms and Pfenninger turbines or a similar type of their own. The small cruiser *Ersatz Schwalbe*, allotted to the Germania Yard, is to have Zoelly turbines.

The trials of the above ships will therefore give opportunities for studying the advantages and disadvantages of the various types.

As the arrangement of turbines in series and their distribution on various shafts are peculiarities of the Parsons type which are protected by patents, it is probable that special agreements will be made with the makers of other types, which will perhaps also further clear up the question of cruising-turbines. In this connection the comparative experiments should also give interesting results.

The first large ship to be fitted with turbines will be the armoured cruiser *F*; these will be of the Parsons type, and like those for the *Dresden*, are being built by the constructors, Messrs. Blohm and Voss, in their own shops.

The waiting attitude which the German Navy at first took up with regard to the question of turbines for battleships may,

after the manœuvring trials of the *Dreadnought*, be considered as fully justified. In any case, the problem was not sufficiently solved for it to appear desirable to equip, as would be necessary in the interests of uniformity, a whole division of battleships with turbines. There is, indeed, still no reason for hastening the introduction of turbines in the German battleships. Difficulties as regards the raising of a sufficient and reliable engine-room personnel were of considerable influence in England. Under such circumstances, engines must be simplified as much as possible, even if disadvantages of a military and technical nature are at the same time produced.

Steam Turbines in Merchant Vessels.

The "Lusitania" and "Mauretania."

As in the case of the *Dreadnought*, the choice of steam-turbines as the motive power of the two powerful Cunard liners *Lusitania* and *Mauretania* was the result of exceptional conditions. It was intended to again win for England the blue riband of the Atlantic, which had been held by Germany for ten years. It was difficult to obtain for such gigantic ships reciprocating engines of sufficient power (70,000-H.P.) for this purpose. The experiment has succeeded, and the blue riband regained by England, but the victory has been rather dearly purchased with an annual Government subvention of £150,000.

This sum will only be paid to the Cunard Company by the British Government if both steamers maintain an ocean speed of 24·5 knots per hour; otherwise the amount will be proportionately reduced. This speed has up to the present[1] not been attained by either of the two ships, although the *Mauretania* came very near it on the voyage out in March with a speed of of 24·42 knots. The *Lusitania* made her best record on her third voyage out with a speed of 24·25 knots; she broke the German record held by the *Deutschland*, of 23·15 knots on her second voyage out with a speed of 24·002 knots.

The German record for the return voyage of 23·58 knots, held by the *Kaiser Wilhelm II.*, was broken by the *Lusitania* in November 1907 with 23·62 knots, whilst the *Mauretania*, after doing her first return voyage in December 1907 at a speed of 23·69 knots, in January 1908 made a new world's record for the return voyage of 23·9 knots.[2]

The superiority over the German record is not so great in the case of the return voyage as in that of the voyage out.

[1] Middle of May. At the end of May, 1908, the *Lusitania* maintained on the voyage out an average speed of 24·83 knots.

[2] The latest German liner, the *Kronprinzessin Cecilie*, of the North German Lloyd, on her first seven voyages attained the following average speeds: Cherbourg-Sandy Hook, 22·27 knots; Sandy Hook-Plymouth, 22·66 knots; both together, 22·47 knots. The corresponding figures for the first seven voyages of the *Lusitania* on the somewhat shorter run from Queenstown to Sandy Hook are 22·46, 22·95, and 22·71 knots.

This is rather remarkable, as the return voyage conditions are more favourable to the *Lusitania* and *Mauretania* than to the German liners. The only explanation of this is that on the voyage out the two former use picked coal, whilst on the return voyage they use ordinary coal, like our liners. Under these circumstances the performances of the German ships appear in a considerably more favourable light.

The boiler installation, consisting of cylindrical boilers, appears to have somewhat too great a strain put on them with these record runs, as it is understood that at least 27 lbs. of coal per square foot of grate surface per hour were burnt, whilst the German steamers only consume 20·7 lbs. per square foot. As, with such demands made on them, the boilers must gradually suffer, and, in contrast to reciprocating engines, there is no increase in the efficiency of the turbines through improved running, it appears doubtful whether the ships will develop and continuously maintain the average speed of 24·5 knots required. From the figures given above it is not to be expected for the return voyage.

This average speed has only been attained occasionally for single days, though of course it has been exceeded for short periods. In any case the trial performances have not been approached. On a trial run of 1,200 knots the average speed maintained by the *Lusitania* was 25·4 knots, by the *Mauretania*, 26·04 knots. On these runs the displacement was to have been the same as that on the second day of an Atlantic passage. This was assumed to be 36,630 tons; it should, however, have been taken at from 42,000 to 43,000 tons, corresponding to a displacement on the day of departure of 45,000 tons. A reason for the lowering of the speed may also be found in this difference.

The Combination of Reciprocating Engines and Turbines in the "Europa" and "Alberta."

In contrast to the Cunard Line, the Hamburg-Amerika Line appear to attach more importance to comfort on board their steamers than to an extraordinary speed. The *Europa*, the contract for which has been given to Messrs. Harland & Wolff of Belfast, and whose construction is being rapidly pushed forward, will only have a speed of 20 knots; she is to be 795 feet long, as compared with the 786 feet of the *Lusitania*, and will therefore be the largest vessel in the world. It is stated that she will be supplied with a combination of reciprocating engines and steam turbines. This information is probably correct, as this system has already been installed on other steamers of the above-mentioned firm. The first ship so fitted will be the *Alberta*, which is being constructed to the order of the International Mercantile Marine Navigation Company for the Canadian service, and will carry out her trials this spring. She will have three shafts, the two side shafts will be driven by reciprocating engines, and the centre one by a steam turbine.

Presumably this will be a low-pressure turbine, which will utilise the exhaust steam from the two reciprocating engines. For manœuvring and going astern the two reciprocating engines only will be used.

Stimulated by the success of the *Lusitania* and *Mauretania*, the firm are now going to construct a steamer of 30 knots speed, which will be somewhat larger than the *Alberta*, but will have similar combined engines. This ship will probably be of about the same size as the *Carmania* (see *Nauticus*, 1906). Her engines will be arranged similarly to those of the *Alberta*. The two reciprocating engines will be quadruple-expansion engines, working with an admission-pressure of 214 lbs. per square inch.

This combination of turbines and reciprocating engines is of special interest, as it is not improbable that the North German Lloyd, in order to surpass the performances of the *Lusitania* and *Mauretania*, will also adopt it, especially as there are various indications that the Vulcan firm at Stettin, who have hitherto constructed the North German Lloyd liners, view it with favour.

Advantages and Disadvantages of the Combined System.

The combined system undoubtedly offers numerous advantages as compared with turbines alone. In the first place, special astern-turbines are done away with; manœuvring is effected in the same way as with an installation of reciprocating engines only. The steam consumption, in contrast to ships fitted with turbines only, must be more favourable than in the case of former ships with reciprocating engines, as a low-pressure turbine is added to the economically-working reciprocating engines, the steam being more fully expanded than in the latter alone.

These advantages are, of course, only fully apparent when a comparison is made with the existing Parsons turbines, in which the first expansion of the steam is not very favourably utilised. If impulse-turbines with few pressure stages are employed in the high-pressure portion, a steam consumption might be attained as favourable as that with the combination of reciprocating engines and low-pressure turbines. The disadvantage that special astern-turbines are required is amply compensated for by the simplicity of the installation, and probably also by economies in weight and space. With a combined installation the height required is the same as with reciprocating engines alone; the weight and floor-space will perhaps be somewhat greater.

Moreover, with a combined installation there are still the disadvantages inseparable from reciprocating engines—the wearing-out to which many of their parts are liable and the necessity for continuous attendance and frequent repairs.

The advantage that with a combined installation it is possible, by means of the reciprocating engines, to economi-

cally steam at a reduced speed is not of much importance for liners, nor for merchant steamers generally, as they usually steam at full speed.

French Liner with Turbines.

A French steamship company, the Compagnie Générale Transatlantique, is having a liner of 25,000 tons displacement and 23 knots speed constructed at the Chantiers de l'Atlantique, St. Nazaire, for the Havre to New York service, which is to be fitted with steam turbines. No information is available as to the type of turbine, but it will probably be Parsons. She will be ready for trials at the commencement of 1910. The results will be so much the more interesting, as the ship comes between the *Deutschland* (23,620 tons) and the *Kaiser Wilhelm II.* (26,000 tons) as regards size.

Other Vessels with Parsons Turbines.

The figures given on page 326 show the progress made in the equipping of other merchant vessels with Parsons turbines. The most important are perhaps the three Japanese mail steamers *Tenyo Maru, Chiyo Maru,* and *E,* of 21,650 or 25,000 tons displacement, 19,000-H.P., and 18 knots.

Other Turbine Systems.

The progress of other systems is not insignificant even compared with this great extension of the Parsons turbine as regards merchant vessels. A notable example is the American mail steamer *Creole,* of the Southern Pacific Company, equipped with Curtis turbines; her principal features were described in last year's *Nauticus.* She is a twin-screw steamer of 10,000 tons, with two 4,000-H.P. Curtis turbines.

A comparison of these turbines with the A.E.G.-Curtis turbines of the *Kaiser* (see *Nauticus,* 1906) is interesting, especially as the latter has two turbines of 3,000-H.P. each, and is only 25 per cent. smaller.

The go-ahead turbine of the *Creole* has 7 pressure stages, the first of which is divided into 4, and the other 6 into 3, speed-stages. In the *Kaiser* the high-pressure portion of the go-ahead turbine is divided into 5, and the low-pressure portion into 21, pressure-stages; of the 5 high-pressure stages, the first is divided into 3, and the following 4 into 2, speed-stages. In the low-pressure portion, therefore, the turbines of the *Kaiser* deviate from the original Curtis type.

The astern turbine is similar in each ship; it has 2 pressure-stages, each with 3 speed-stages.

Corresponding to the greater expansion (at each stage), the pressure stages of the *Creole's* turbines are separated from one another by diaphragms; with the *Kaiser's* turbines this is only the case in the high-pressure portion and in the astern-turbine.

It is noteworthy that the turbines of the *Creole*, in spite of their lower number of revolutions, 250 as compared with 600, and their smaller number of pressure-stages, are only about 2·29 feet greater in diameter than those of the *Kaiser*. The former have an outside diameter of about 11·15 feet, and the latter one of 8·86 feet. The length of the turbine casing, exclusive of bearings, in the *Creole* is about 14·7 feet, in the *Kaiser* 11·48 feet. The ratio of the length to the breadth in each case is, therefore, approximately as 1 to 1·3. The division of the low-pressure portion into a large number of pressure-stages does not therefore affect the length very unfavourably.

The running wheels in the *Kaiser* are massive steel discs; in the *Creole* they consist of two metal plates fastened together at a certain distance apart, probably on account of the greater difficulty of constructing solid steel discs.

In the *Kaiser* half of the nozzles at the first high-pressure stage were arranged so that they could be disconnected; the object of this was to obtain an economical steam consumption at low powers, but it was not successful. In the *Creole* the cutting-off of the nozzles is carried still further, but, from the steam consumption figures given below, with no better result. Twelve nozzles, capable of being disconnected, are fitted before the first stage; only as many as are necessary for the speed desired are connected up. At normal power 9 nozzles are connected. Before each of the following pressure-stages there are 2 valves, each of which can cut off one-fifth of the nozzles. Before the astern-turbine there are also 12 nozzles fitted, 6 of which can be cut off.

For manœuvring, all the nozzles are connected up, the speed being regulated by throttling the steam.

At full speed the ship was brought to a standstill 2 minutes 42 seconds after the order to stop was given, the ship covering a distance of from $3\frac{1}{2}$ to $4\frac{1}{2}$ times her own length.

The steam consumption was only measured for the port turbine; its effective power was simultaneously calculated by means of the Föttinger torsion indicator. The power and steam consumption of the starboard turbine was estimated from the corresponding readings (steam pressure, number of revolutions, etc.).

With a superheating of the steam of 86° to 104° F., the most favourable steam consumption with full load (4,000-H.P.) and 250 revolutions was 15·87 lbs. per effective H.P. per hour for the turbine alone; with 1,400-H.P. and 178 revolutions it was 23·15 lbs. With half load (2,000-H.P.) the steam comsumption amounts to about 20·94 lbs. Including the auxiliary engines, it amounts to from about 1·1 to 1·54 lbs. more. Assuming an eight-fold vaporisation, the coal consumption for the turbines alone was, therefore, with full load, 1·98 lbs. per effective H.P. per hour; with half load it was 2·64 lbs.

In the case of the *Kaiser*, the coal consumption for the turbines alone, without superheating of the steam, during a 6-hour

forced run with 5,900-e.H.P. was 1·52 lbs. per H.P. per hour. At a speed of 11 knots, with only about one-sixth of the engine power, the coal consumption amounted to 2·64 lbs. per effective H.P. per hour, the same as in the *Creole* with half load. These more favourable results must be attributed to the higher number of revolutions of the turbines in conjunction with the greater number of pressure-stages; in other words, to a more favourable proportion between the velocity of the steam and the periphery speed of the turbine wheels.

The reports published in *The Navy* and *Engineering* contain no information regarding the speed attained by the *Creole*. It is only stated that the efficiency of the propellers was extremely low, and that the constructors hope to obtain greater speeds with the same engine power by altering the propellers. From this it would appear that the desired speed of 16 knots was not attained.

The following table gives the displacement, H.P., number of revolutions, speed, and diameter of propellers of the two vessels:—

Ship.	Displacement.	Effective engine-power.	Number of Revolutions.	Speed.	Diameter of Propellers.
	Tons.			Knots.	
Kaiser ...	1,923	6,000	600	20	6·2 feet
Creole ...	10,000	8,000	250	16	11·4 feet

INDIRECT PROPULSION BY STEAM TURBINES.

PROSPECTS OF THE DIRECT METHOD OF PROPULSION BY TURBINES.

If an opinion is to be given as to the future of steam turbines, it would be to the effect that they will be generally adopted for all fast ships, especially such as combine great speed and high engine power with a comparatively small displacement. Difficulties confront their introduction in slow, mainly cargo-carrying, steamers, and also in ships which, in addition to great speed, are required to have an economical steam consumption at reduced speed and good manœuvring powers.

Electrical Transmission.

In order to get over the above-mentioned difficulties, it has already been frequently proposed to introduce electrical transmission between turbine and propeller. Such an arrangement would have the advantage that an economically-working turbo-dynamo running at a high number of revolutions per minute, and a propeller running at any desired lower number of revolutions, could be provided. Moreover, with direct current, as with single-phase reversed current, the regulating of the number of revolutions of the motor within wide limits and without much

loss of energy would be possible. Further, no special astern-turbines would be necessary. This question was fully dealt with in *Nauticus* for 1906 (p. 472, *et seq.*).

Up to the present, however, electric motors of several thousand H.P., capable of being regulated, have not been constructed. The employment of electrical transmission must, therefore, at first be limited to low powers and specially suitable cases.

In a paper read before the Shipbuilding Society in November, 1907, on "Electrically-driven Propellers," Schulthes excludes torpedo boats and cruisers at the outset from electrical transmission, and rightly looks to its employment in slow ships. But when he states that direct turbine propulsion is unsuitable for ships like the *Lusitania*, we cannot agree with him, especially as electrical transmission for such high powers cannot be introduced in the present position of electrical engineering, nor is it to be expected in the near future.

For a twin-screw cargo and passenger steamer, with an engine power of 6,000-H.P. at the propeller shafts, Schulthes roughly calculates the economies effected by electrical transmission to be as follows:—In weight, 480 tons; in space, 38,496 cubic feet; in coal, £484; and in oil, £567 per annum. The engine room personnel can, in his opinion, be reduced by from 1 to 2 men per watch.

Unfortunately, the cost of constructing the installation is not given. It might be considerably higher than for an ordinary set of reciprocating engines and still be more economical, as the additional first cost would be more than made good by the saving in working expenses.

The German Navy is in a position to practically test electrical propulsion on a large ship. The salvage-ship for submarines constructed in Howaldt's Yard at Kiel is fitted with this system. The two turbo-dynamos, which are together of 1,200-H.P., and run at 2,500 revolutions per minute, are installed on the lower deck. They supply current to the propeller-motors placed in the after part of the ship, and also serve for charging the accumulators of the submarines. At 200 revolutions the propeller-motors each develop 600-H.P. at the propeller-shafts, and give the vessel a speed of from 11 to 12 knots. Each propeller can be driven by a separate turbo-dynamo, or both propellers can be simultaneously driven by one turbo-dynamo only. The motors are regulated from the bridge. The ship can, therefore, be manœuvred direct from the bridge without any orders being sent to the engine-room.

In addition to testing the electrical method of propulsion, the experiment will perhaps also throw some light on the propeller problem, as this method permits measurements to be easily taken.

A special type of electrical transmission is the "del Proposto" system, which will be referred to later in discussing internal combustion motors.

With this system, electrical transmission is only used for manœuvring and going astern; for full speed the propeller-shaft is connected with the driving-engine itself by an electro-magnetic or mechanical coupling. The arrangement has the advantage that electrical transmission only requires to be occasionally used for high powers, but the movable coupling is a disadvantage that prevents the employment of the system for very high powers.

This disadvantage is avoided by an arrangement patented by the firm of Brown-Boveri, in which an electro-motor, which is rigidly coupled with the propeller shaft and receives its current from a turbo-dynamo installed in another part of the ship, is provided as the driving-engine for cruising speeds and for manœuvring. When the electro-motor is in use, the main turbine runs without load in vacuum; for longer periods, it can, however, be disconnected.

An improvement of the propeller-efficiency through electrical transmission, would not, of course, come into question with the two last-named systems, as the propeller must be constructed for a high number of revolutions in view of its being driven direct at high speeds.

Hydraulic Transmission.

Recently it has been proposed to make use of hydraulic transmission. In this system the steam-turbine drives a high-pressure rotary pump, and this drives a water-turbine installed on the propeller-shaft. The speed could be regulated either by disconnecting some of the stages of the rotary pumps, which are divided into several stages, by working with several speed-stages in the water-turbine, or by the employment of various turbine-wheels of increasing diameter. For going astern special rings of blades would be necessary.

For such hydraulic transmission Langen, in *Schiffbau*,[1] calculates the following efficiencies:—Steam turbine, 72 per cent.; rotary pump, 80 per cent.; "Pelton" wheel, 85 per cent.; propeller, 65 per cent.; altogether, therefore, 32 per cent.

For electrical transmission the following may, according to the same author, be reckoned:—Turbines, 70 per cent.; power transmission, 90 per cent.; propeller, 60 per cent.; altogether, 38 per cent.

The total efficiency of a propeller-drive with reciprocating engines amounts to about 30-32 per cent., with direct turbine-drive about 32-34 per cent.

The efficiency of all three methods of propulsion is, therefore, approximately equal with full load; electrical transmission is the most favourable. The economical advantages of electrical and hydraulic transmission are more conspicuous at reduced

[1] "Steam Turbines in Ships," von Langen, *Schiffbau*, 1907, p. 356, *et seq.*

speeds, as with both methods of transmission the efficiency remains approximately the same, whilst with direct turbine-drive it falls considerably.

In comparison with electrical transmission, hydraulic transmission, which has a somewhat lower efficiency, has the advantage that its utilisation for higher powers presents fewer difficulties. An arrangement for cruising speeds only can, of course, be provided with it, similar to that proposed by Brown-Boveri for electrical transmission.

DEVELOPMENT OF MOTORS FOR SHIP PROPULSION.

Whilst steam-turbines have been used in ships for installations of the highest power, the internal-combustion engine has, up to the present, been limited to low powers and to small craft. On shore, however, in the form of a large gas-engine, it frequently successfully competes with the turbine.

The utilisation of motors in boats was fully discussed in last year's *Nauticus*. There is nothing of importance to be added.

The construction of the motor is tending more and more to emancipate itself from the influence of the motor-car and to assume the approved form and arrangement of the steam engine, which has developed from the heavy land-engine to the light marine-engine, specially exemplified in the engines of torpedo boats. The development of the motor has taken the opposite course. Undoubtedly great progress has been made, but the cutting down of the weight, as was necessary in motor-car construction, is very objectionable and quite unnecessary in boats for practical use and not for racing, as the saving in weight possible in the case of a seaworthy boat of normal speed is much too small in proportion to the displacement. The main necessity is absolute reliability. It must be remembered that the demands made on a boat's motor are much greater than those made on the engine of a motor-car. Whilst the latter is only required to work at its highest power for shorter periods, and is frequently getting rests when going downhill or during stoppages on account of road obstructions, the boat's motor must be able to run continuously at full speed. The matter has not been sufficiently considered from this point of view, with the result that many breakdowns have occurred which might have been avoided if the various parts of the engines had been sufficiently strong.

Improvement is still needed in the system of ignition, particularly the sparking plugs, which do not always withstand the high temperatures and are very liable to foul, especially when petroleum is used.

It is, therefore, so much the more to be regretted that the only motor which works without such a system of ignition (the Diesel motor), has only been made use of for boats to a very

limited extent. With it the air is compressed until over the ignition temperature of the fuel and the latter is injected into the cylinder in a finely sprayed condition. The combustion is thus uniform and perfect; this motor can, therefore, work with heavy oils, which cannot be used in "explosion" motors.

The latter work best with light oils, like benzine. This is, however, very expensive, and its introduction on board a vessel much too dangerous as regards fire; it cannot, therefore, be considered for warships' boats. Petroleum may, from this point of view, be considered suitable, but, as already stated, it fouls the sparking plugs, and also the cylinder, thus injuriously affecting the piston in consequence of the high combustion temperatures. The considerable heating of the piston in conjunction with the unconsumed residue frequently leads to early firing. These difficulties increase with the diameter of the cylinder, so that for larger motors it is proposed to carry cooling water through the piston rod.

For ships' motor-boats in our Navy benzol-spirit—a mixture of about 75 parts 90 per cent. spirit and 25 parts benzol—is generally used. As regards its introduction on board, this fuel is not more dangerous than petroleum; the consumption per H.P. is approximately the same, the cost per kilogram somewhat higher. The disadvantage of the pure spirit that, in the case of combustion with too small a quantity of air, acetic acid is formed, which leads to the formation of rust in the cylinder, is diminished with the benzol mixture. For starting the motor, benzine, as with petroleum, must generally be made use of; the carburettor must also with this fuel be heated by the exhaust gases. So far as the size of the motor permits, starting is done by hand by means of a special starting-crank, as with motor-cars. Larger motors are started by compressed air, which is stored in receptacles, or an explosive mixture is injected into the cylinder. Sometimes a small explosion-motor is specially installed for starting the larger.

Electro-motors are also used for starting, if, as on submarines, accumulators are already present for other purposes.

For reversing the propeller shaft, reversing gear is used, or propellers with reversible blades are fitted. With higher powers, where these arrangements are inconvenient, the motors themselves are reversed by means of compressed air. Special reversing gear must then be fitted to the cam shaft.

A self-acting reversing arrangement, which is, however, only suitable for smaller powers, is fitted in the Swedish reversing-motor, which the firm of Howaldt of Kiel are licensed to construct; the reversing is effected through early ignition during the compression period and guiding the reversing apparatus into a curved disc of special shape. Of course, the reversing can only be carried out whilst the motor is running.

Reversing the propeller shaft by means of electrical transmission, as, for example, in the del Proposto system already mentioned above, is perfect in action, but such an installation

is expensive and difficult to set up. The motor, always running in the same direction, drives a direct-current dynamo; this supplies current to an electro-motor placed on the propeller shaft. By altering and reversing the field of the dynamo the number of revolutions and the direction of rotation of the motor can be altered as desired. Del Proposto only uses this transmission for manœuvring and going astern, and, therefore, only occasionally at full power. At full speed ahead the motor is coupled direct to the shaft by means of an electro-magnetic coupling.

Electrical transmission can, of course, be continuously made use of, if, for example, the energy of a dynamo is utilised in several propeller-motors, or the energy of several motor-dynamos is combined in one propeller-motor. Moreover, storage batteries can be added to the installation; the internal combustion motor could then be stopped and these alone used for low powers, or they could be utilised as an additional source of power for full speed. An example of such an arrangement is to be found in the motor-boat *Ellen*,[1] constructed at the Siemens-Schuckert Works, and others, with many variations, in submarines.

The utilisation of motors in ships' boats and warships of various kinds was fully discussed in last year's *Nauticus*.

The introduction of motor-boats as ships' boats has made further progress in all Navies. In the German Navy, in particular, experiments with the various types were so successful that a large number of ships' motor-boats are shortly to be supplied. As was previously the case with ship's steam-boats, it is proposed to supply one type only, in order to simplify working and repair.

In all large navies submarines offer an equally wide field of employment for motors. There will be some fairly difficult problems for motor constructors to solve in this direction, as the single engine sets have already grown to powers of 300-H.P. The difficulties are much greater from the fact that only petroleum is used, as lighter oils cannot be employed without danger in the closed spaces of submarines, and, moreover, on account of the special conditions of stowage, a fuel whose specific gravity is less than that of water must be chosen.

In addition to fitting motors in submarines, certain Navies, especially the English, are considering their installation in coastal torpedo boats. Particulars concerning one such boat were given last year.

The problem is quite solvable; from the military point of view there is something attractive in the idea of constructing at small cost a large number of such boats, which can be carried by rail from one port to another. It must be remembered, however, that these boats can never replace sea-going torpedo boats, and that the submarine is a much more versatile and effective weapon for coast defence.

[1] See Year Book of the Shipbuilding Society, 1908, p. 267, *et seq.*

In the mercantile marine the motor finds employment in tenders, ships' boats, cargo-boats, ferry-boats, etc.; it is also used in pleasure-boats and yachts, and, to some extent, as an auxiliary in sailing yachts and merchant vessels.[1]

One of the largest engine installations of this kind is the 500-H.P. benzine motor in the American four-masted schooner *Northland* of 2,047 gross tonnage. The installation, which closely resembles a steam-engine, is very interesting. It is a double-acting motor with six 10-inch cylinders, having a stroke of 10 inches. It drives a two-bladed propeller 6·8 feet in diameter and 3·9 feet pitch, which gives the vessel a speed of from 5 to 6 knots. For starting and reversing the motor compressed air is used. The benzine is stored alongside the engine in two tanks of a total capacity of 812 cubic feet. Two smaller benzine motors, coupled to dynamos, are installed for generating current for several cranes and for lighting the vessel.

The Diesel Motor.

Whilst in the types of motors just considered, the so-called explosion motors, the pistons are driven by a single explosion, in the Diesel motor the work is done by a series of explosions. This motor can, therefore, in contrast to the explosion motor, be called an equal-pressure motor.

This method of working, in conjunction with the system of introducing the fuel, the injecting in a finely-sprayed condition, results in extraordinarily perfect combustion. As, moreover, there are no special vaporising or ignition contrivances, and the fuel is exploded by being injected into air heated over the ignition temperature of the oil by compression, heavy crude oils, whose employment in the "explosion" motor is quite impossible, can be used with the Diesel motor.[2]

The greater economy in working resulting from the use of such oils, and the greater safety in stowing them, permit the Diesel motor to be regarded as specially suitable for ship propulsion. It is, therefore, surprising that it has only been made use of to any extent in a number of vessels on the rivers and lakes of the Russian oil territory, where the presence of the cheap fuel for which it is suited has probably conduced to its employment.

On shore it is more frequently used; about 1,300 sets, with 1,860 cylinders, and of about 106,000-H.P. have been installed by the Nürnberg-Augsburg Engine-Construction Company alone.

---

[1] The question of auxiliary motors for sailing vessels is fully dealt with in the 1907 and 1908 Year Books of the Shipbuilding Society.

[2] See an article on "The Employment of Liquid Fuel in Ships" in *Nauticus* for 1903; and also "The Present Position of Caloric Engines and the Question of Liquid Fuel, with special reference to the Diesel Motor," by Rudolf Diesel, München (*Journal of the Society of German Engineers*, 1903, p. 38).

The reason for its having been so little used up to the present for ship propulsion is undoubtedly its too great weight. Recently, however, its constructors have been making efforts to reduce this. In last year's *Nauticus* (p. 425) particulars were given of a reversible 100-H.P. Sulzer-Diesel motor, which weighed about 5 tons without shafting and propeller.

The results of experiments with a rapid-running Diesel motor constructed for use in ships have recently been published in the Journal of the Bavarian "Revision" Society (No. 1, 1908); this motor is constructed for 300-H.P. with 400 revolutions, and weighs about 10 tons. The weight is understood to include starting and injecting apparati, cooling arrangements, lubricating and cooling-water pumps. It is not much greater than that of an equally large "explosion" motor, as a Körting petroleum-motor of equal power, running as a two-phase motor at 550 revolutions, weighs about 8·9 tons.

The motor consists of four single-acting and four-cycle cylinders, with cranks set at an angle of 180°. On a level with the four cylinders is fitted the two-stage air-pump, common to all four cylinders; this draws in air from the atmosphere, and is regulated by the throttling of the air drawn in. The four fuel-pumps are also placed together, and are driven by the reversing-shaft. Each cylinder has an inlet, an outlet, a fuel, and a starting valve. At the end of the crank shaft are fitted two small oil pumps for lubricating purposes; the oil is used again after being cooled.

In addition to the cylinders, the exhaust-tubes are cooled by two pumps driven by rods from the pistons, so that the hot exhaust of the motor into the surrounding atmosphere is very small.

As the motor is constructed for the propulsion of vessels, it has no speed regulator, but simply a safety-regulator, which is intended to prevent racing; its charging and, therefore, the number of revolutions, are controlled by hand. It is not reversible, being intended for submarines, where it acts on the propeller-shaft by means of electrical transmission. For a reversible Diesel motor the two-phase system, on which the Sulzer-Diesel motor mentioned above is constructed, would be preferred as with it the number of reversing valves is smaller.

In the very thorough power and fuel consumption experiments the motor was coupled to a direct-current dynamo. The fuel used was Galician gas oil.

Although the motor was only constructed for 400 revolutions and 300-H.P., its number of revolutions was increased to 500, and its effective power to 400-H.P.

With the alteration of the number of revolutions from 250 to 500, with various mixtures and with powers varying from 100 to 400 H.P., the motor worked with perfect combustion and without trouble of any kind with the distributing mechanism or the driving-gear.

Its fuel consumption and heat utilisation were little, if at all, inferior to those of the slow-running Diesel motors; its mechanical efficiency is, from the experiments, equally good.

We have considered somewhat carefully the experiments made with this motor, because they appear calculated to throw new light on the employment of the Diesel motor, which is well worth striving for, especially in the case of submarines.

The Suction Gas Motor.

Whilst the motors so far dealt with are worked by a mixture which is produced from oils, the suction-gas motor makes use of a gas produced from solid fuel (anthracite, coke, coal), this gas being drawn in from the generator by the motor itself.

The method of producing the gas is as follows:—A mixture of steam and air is led through a glowing mass of coal. The carbonic acid produced by combustion of the oxygen of the air is reduced to carbonic oxide; hydrogen is formed from the steam. On the installation being started, a draught is produced through the lowest layer in the fuel receptacle by a fan worked by hand or by a small motor; the gases developed pass through a steam generator, the steam from which is led under the grate by a pipe with openings at the end in the form of nozzles. Through the suction effect of the flowing steam, air is simultaneously drawn along with it. In this way the gas production process, which is fully developed through the suction effect of the engine after it is set going, is started.

Before the gas reaches the engine it is led through a cleanser. In land installations this is filled with coke, which is continuously sprinkled with cold water. The impurities contained in the gas are here removed. In ships, where a coke cleanser would be too heavy, the cleansing must be carried out in another way. In a gas producer for an 80-H.P. Capitaine ship's motor, for example, the cleansing was effected by the gas being led through a chamber in which water is transformed by air into its most finely sprayed form.[1] The mixture of water and gas produced by the streaming through of the gas is then again separated in a centrifugal cleaner, where the particles of tar and ashes contained in the gas are removed together with the water.

Although it is possible, by using anthracite, brown coal briquettes, or best coke, to produce a comparatively clean gas, if bituminous coal containing much tar is used, the difficulties are very considerably increased. In ships, however, this must be provided for. The use of such a fuel renders a considerably larger and more complicated cleansing apparatus necessary. Moreover, the vaporised water cannot be recovered, so that in ships a specially constructed vaporiser must be employed.

[1] See the Year Book of the Shipbuilding Society for 1905, in which there is an article by Capitaine on "The Gas Engine for Ship Propulsion," which goes fully into the problems connected therewith. Of course, as inventor and constructor of such engines, he is rather biassed.

The great hopes which were centred in suction-gas engines, in view of the considerable success obtained with large gas engines, the gas for which was produced by means of blast and coke furnaces, have not been fulfilled. The chief difficulty has been the cleansing of the gas, especially when cheap coal is used. The use of expensive fuel makes the economy of the suction-gas engine doubtful, especially as its high efficiency depends on its being continuously run with full load. The loss from the generator when the engines are stopped may amount to 20 per cent. of the consumption at normal power.

Under these circumstances the use of suction-gas installations on shore has somewhat declined, and is limited to cases in which the conditions are specially favourable for providing a suitable fuel.

Suction-gas engines have, generally speaking, not yet been introduced in ships, except for a few experimental installations. Their employment is at present limited to a few boats with Capitaine motors, among them a Hamburg tug, a yacht constructed by Thornycroft, and a few vessels on the Rhine fitted with Otto engines at the Deutz gas-motor works.

Recently, experiments have been commenced by the English Navy with a Beardmore-Capitaine motor in the former gunboat *Rattler*. The motor has five cylinders, 20 inches in diameter and of 24-inch stroke, and develops 500-H.P., giving the vessel a speed of from 10 to 11 knots. It is started with the assistance of a mixture of gas and air at high pressure. For going astern the shaft is reversed. The weight of the engine installation, inclusive of an auxiliary boiler for pumps, etc., is said to be 94 tons, as compared with the 150 tons of the former reciprocating engines, with boilers; the saving in coal is about 50 per cent. In the weight given the fuel supply may be included, and the saving in weight be merely due to the smaller amount of fuel required with the suction-gas installation.

Motors in Large Vessels.

If the present development of motors as described above is studied, it will appear premature to speak of their employment in the largest vessels. The question is, however, constantly being discussed in the technical and daily papers, and its solution spoken of as being very near.

McKechnie's Proposals.

A paper, which Mr. J. McKechnie, Director of Engine-Construction at Vicker's Works, read at the meeting of the Institution of Naval Architects in the spring of 1907 on the "Influence of the Engines on the Artillery Power of Modern Warships," called forth special discussion.[1] It was not so much the lecturer as his audience who developed this subject

[1]See *Marine Rundschau*, 1907, p. 632.

and lent importance to the meeting, especially as regards the introduction of motors as the main engines, so that shortly after the Press of other countries took the matter up.

McKechnie considers the advantage of motors to lie not in technical superiority or greater economy, but chiefly in the possibility, through the absence of funnels, of producing more favourable conditions for mounting the heavy guns.

He takes as the basis of his scheme a battleship of about 16,000 tons displacement. The gas-engine installation of 16,000-H.P. is divided into 3 groups, which are placed in 6 compartments. The ship has 4 propeller-shafts, each of which is driven by a 10-cylinder vertical gas-engine. The gas producers are placed in the two compartments amidships, whilst forward there are four sets of air-compression pumps driven by gas motors, which presumably are to serve for starting the main engines. The remaining auxiliary engines—dynamos, steering-gear capstans, pumps—are driven by special "explosion" motors using liquid fuel.

Of course, the proposer of this scheme claims for motors considerable economies in space and weight. These statements are not, however, of much interest, as they are merely rough estimates.

Quite apart from the practicability of such an installation, with which we will deal later, the scheme is unsound, because it rests on a false hypothesis. McKechnie assumes that with motors, funnels are superfluous. The enormous volume of combustion-gases emitted by a 16,000-H.P. gas engine installation must be got rid of somehow. They cannot be released above water at the side or aft, as that would make it impossible to stay on deck. Neither can they be released under water, as the pressure of the water would reduce the efficiency of the engines; moreover, such large under-water openings—50 to 80 square feet—would be dangerous.

It is a widely-spread misapprehension that funnels are essential to a steam engine installation, and not to a gas-motor installation. If the obstacles mentioned above did not exist, a steam boiler installation of this power could be worked without funnels, as the air pressure produced under the grates by fans is so high that the small pressure height of the funnels need not be considered in comparison with it. Admiral Fremantle, therefore, was not correct when, in the interchange of views concerning this scheme, he maintained that the destruction of the funnels in action would seriously reduce the power of the steam engine.

In addition to it not being possible with such a gas-motor installation to dispense with exhaust tubes of the nature of funnels for leading away the gases, the provision of shafts for ventilating the engine-rooms must also be reckoned with, especially as there is not only the hot exhaust from the motors, but also the possibility of poisonous gases being emitted, to be provided for.

For these reasons the above-deck structures with internal combustion engines must be similar to those with steam engines, and the gun arrangement proposed by McKechnie becomes impossible.

Even if this main object could be attained, far greater difficulties would be met with in introducing such large internal combustion engines in ships.

As McKechnie himself stated, his conviction of the practicability of such large internal combustion marine engines is based on experiments made by his firm with an 800-H.P. installation. The late Director of Naval Construction, Sir William White, during the discussion, rightly pointed out that such a jump from 800 to 16,000 H.P. is rather a sporting proposal.

Schemes similar to McKechnie's are sure to be continually put forward. We will, therefore, further consider the practicability of such large internal combustion engines for ships in the present state of motor engineering.

Practicability of Large Oil Motors.

Of oil motors, only those which use heavy oils can be taken into consideration. With benzine, spirit, and even petroleum, the danger of fire is much too great with the large quantities it would be necessary to carry; moreover, they are too expensive. Lamp petroleum, for example, costs about 1·06d. per lb.; this is ten times as much as the cost of coal. Therefore, even if the petroleum motor utilises its fuel two to two-and-a-half times better than the steam engine, its working costs are still four to four-and-a-half times as great. "Explosion" motors being dependent on this fuel, as we have seen above, must therefore be left out of consideration.

There remains, therefore, the Diesel motor, which can use heavy and cheap oils, and, in addition, possesses the advantage that it works without special ignition arrangements or vaporiser, as a result of which it is very reliable.

Like all oil-engines, it has, however, the disadvantage that the cylinder-diameter cannot be increased as much as desired, and brought somewhat near that usual with steam-engines. The difficulty arises from the fact that the motor works at a considerably higher pressure than the steam-engine, and that in consequence, when increasing the cylinder-diameter, powers are finally arrived at which are impossible with crank drive. Moreover, as already stated, the difficulty of cooling the piston increases with the diameter.

With Diesel motors the greatest power of one cylinder is 200-H.P., with about 140 revolutions. For an engine installation of 16,000-H.P., 80 cylinders must, therefore, be provided, and valves and distributing-mechanism repeated for each cylinder. With the arrangement of a Diesel motor already described, this alone would necessitate 320 valves.

As an installation so sub-divided cannot work direct on the propeller-shafts, the only way out is electrical transmission, a central station being arranged in which Diesel motors drive a large number of dynamos, the current being led to a small number, at the most, perhaps, four, of propeller-motors.

Such a system was actually proposed by a Russian engineer, Lieutenant Philippow, in 1905, and was described in *Schiffbau*. This system provides for 30 Diesel-motor dynamos, with a total of 16,000-H.P., which is divided between four electro-motors of 4,000-H.P. each, working at 120 revolutions. Two electro-motors work on one shaft.

Even if the construction of these large propeller-motors is assumed to be possible, there still remains the difficulty of manœuvring with them, as this is increased by the large number of prime movers. The working of the numerous prime movers will scarcely present more difficulties than an equally large steam engine installation, with its numerous boilers and the pumps and auxiliary apparati necessary for the working of the engines and boilers. Problems connected with weight and space are capable of satisfactory solution with the progress already made in the construction of fast-running Diesel motors, especially as, in comparison with steam engines for the same radius of action, a considerably smaller supply of fuel would be necessary. With such an installation there would only be an advantage as regards economical working, if cheap crude oil could be used. Sufficient experience has not yet been obtained concerning the continuous reliable working of Diesel motors with such crude oils, and, moreover, this fuel is not to be obtained everywhere in the quantities required like coal. In comparison with coal, the storage of liquid fuel on board ships is difficult, as the oil compartments are, in practice, generally found to leak. In addition, the absence of coal removes an important means of protecting a ship, and even heavy oils, in case of injury to the hull from grounding or from a torpedo, constitute a source of danger which is not to be under-estimated.

The Practicability of Large Suction-Gas Installations.

The last-mentioned disadvantage does not appear with suction-gas motors, which, in addition to Diesel motors, alone come into consideration for the propulsion of large ships. They have, however, the disadvantage that they require special gas generators and cleansers. The difficulty of cleansing the gas has already been spoken of. On account of this difficulty and the scorifying in the gas generator, the use of ordinary coal is practically excluded. Fuel like anthracite is not, however, to be obtained everywhere in sufficient quantities, and it would make the cost of working so high that the only reason for introducing suction-gas installations in ships — the greater economy—would disappear. Moreover, apart from the high cost of the fuel, the economy would be rendered doubtful by the great

waste in the gas generator when the engines were stopped or running at a low speed.

Further difficulties are to be met with in conducting the gases from the generators to the engines. The gases are poisonous; every leakage from the conducting pipes may therefore be dangerous to the crew in the narrow engine-rooms. It has already been proposed to surround the pipes with a jacket of compressed air, but for a long system of pipes, this would be rather troublesome and difficult.

The suction-gas engines have the advantage over oil motors that they are practicable up to powers equal to those of modern steam engines. Of course, engines of this power must be gradually developed for use in ships, as the experience gained in the construction of gas-engines of several thousand H.P. for use on shore is not sufficient.

As compared with steam-engines, gas-engines would always have the disadvantage that they are not directly reversible, and require special auxiliary installations for reversing and for starting. In large installations, electro-motors, in conjunction with accumulators, are not suitable for this purpose; in these only compressed air can be made use of. The dimensions of the air compressors and receptacles that would be necessary in a warship steaming in company are well illustrated by the rough calculation that for twice reversing an engine installation of 16,000-H.P., about 810 cubic feet of air, at a pressure of 60 atmospheres, would be necessary. In McKechnie's scheme a very considerable space is allowed for the compressor installation, but it may not be adequate.

If all these installations, the gas-generator with its cleansing apparatus, the complicated system of pipes, the air-compressors for starting the engines, and the numerous auxiliary apparati, are included, it would appear probable that such an installation would not be lighter, but heavier, than a steam-engine installation.

CONCLUSIONS.

Advantages of Internal Combustion Engines.

For large ships, as we have seen, neither advantages as regards economy nor any considerable saving in weight and space are to be expected from internal-combustion engines. The reduction in the amount of fuel necessary to be carried, and the consequent decrease in the size of the bunkers, constitutes the only advantage as regards weight and space.

Other military or technical qualities peculiar to internal combustion engines, which will lead to their further development, have yet to be discovered.

An undoubted advantage is the absence of smoke, which makes it possible to approach the enemy without being observed. This can, however, be practically equally well attained with a steam engine installation by using oil fuel.

Oil motors are always ready, and can be started in a few minutes. Suction-gas motors do not possess this merit. As we have seen above, the waste in the gas generators when the motors are stopped is rather great. It takes longer to get the gas-generator going than it does to raise steam in boilers, especially small-tube boilers.

Internal-combustion engines do not strain the engine-room personnel as much as steam-engines; there is no longer the boiler installation, which, especially at forced draught, throws such a great strain on the stokers, to be attended to. This, again, mainly applies to oil motors, which automatically develop their highest power without making any special demands on the personnel. In the case of suction-gas installations, the attendance required by the gas-generator cannot be much less than that required by steam boilers, especially with large installations, if the fuel receptacle of the gas-generator is limited in size in order to effect a saving in weight. The statement made in all commendations, even those appearing in technical papers, of the suction-gas motor as a marine engine, that the gas-generator only needs to be filled with fuel once a day, of course, only applies to shore or small marine installations.

Another frequently commended advantage of internal combustion engines is the absence of a system of steam-pipes. In the case of the suction-gas installation, however, there is the much more dangerous gas-pipe system to take its place. Whether leakage from an oil pipe is less probable, and its injury in action less dangerous, may be regarded as doubtful.

If, therefore, we sum up the foregoing, the advantage possessed by all internal combustion engines is the absence of smoke; in addition, oil motors have the advantage of constant readiness and immunity from trouble in working.

Disadvantages of Internal Combustion Engines.

These few advantages have a number of disadvantages to counter-balance them; most of them have already been discussed in considering the separate systems.

Difficulties as regards starting, reversing, and large alterations in the number of revolutions, are common to all internal combustion engines.

In this respect the steam-turbine is much more satisfactory. It can be started like a reciprocating engine; its number of revolutions can be altered within wide limits by throttling the steam or connecting and disconnecting pressure stages; finally, the propeller shaft can, comparatively simply, be rendered reversible by the installation of an astern-turbine.

From this point of view the introduction of the internal combustion engine would appear to be a retrograde step. The real retrogression would, however, be the fact that a piston-engine with crank-drive, whose numerous transmitting and distributing parts need more attention and repair than the

steam engine, was being developed to take the place of the rotating-engine, the steam-turbine.

Merits of Rotating Engines.

The introduction of the steam-turbine for shore and marine use, in conjunction with the development in the employment of electric power, has opened up a great future for rotating engines. There must be very great merits in internal combustion engines, if engines with crank drive are again to come into favour. That even great economy is not sufficient to ensure this is well shown by the fact that the highly-developed and very economical superheated steam engine cannot compete—at least for high powers—with the steam-turbine, and that, with a few exceptions, its adherents have not, up to the present, succeeded in getting it utilised for the propulsion of ships.

If any internal combustion engine could have a chance of being generally adopted for the propulsion of ships, it would be the gas-turbine. This is, however, at present in a purely experimental stage of development, and the results so far obtained, thermal or mechanical, do not warrant the hope that, even for land installations only, a practical gas-turbine can be produced in the near future.

Prospects of Internal Combustion Engines.

The internal combustion engine, in its present form, and where the conditions are specially suited to it, will, of course, maintain its position, and will find many new fields of employment. Thus, it will probably not only remain the most suitable means of propulsion for ships' boats, small torpedo boats, submarines, and small yachts, but will be more extensively made use of as an auxiliary engine for sailing ships, and for the propulsion of small and moderate-sized, including seagoing, cargo vessels. In these directions much may be expected from the Diesel motor in particular, especially if its starting and reversing arrangements are improved, so that it can be used with direct propeller-drive in moderate-sized vessels.

COMMUNICATIONS ON THE BATTLE-FIELD.

Translated by permission from *La Revue d'Infanterie.*

THE difficulty, if not impossibility, of transmitting orders or intelligence under the fire of modern weapons was, for the first time, clearly revealed during the Anglo-Boer War, as the following examples will show [1] :—

At the battle of Elandslaagte (19th October), during the decisive attack delivered by the English, " Generals and superior officers were no longer able to direct the fight; everything depended on company and even section commanders."

In one of his despatches, Lord Methuen says :—" It is not possible to distinguish any officer in khaki, now all badges have been removed, to say nothing of the difficulty of sending a message, the aides-de-camp having to bound from boulder to boulder, endeavouring, at the same time, to keep under cover."

An officer of the Scots Guards, who took part in the battle of the Modder River, which occurred on the 25th November, 1899, wrote in a letter :—" We had marched for some miles deployed in line, never expecting to meet the enemy, when we were suddenly attacked by a well-directed fire on our whole front. As there was no cover, and the Boers were completely hidden behind trees and bushes, we lay down on the ground, firing when we could do so, and *waiting for orders which never came.*"

Lord Methuen attributed the lack of unity of direction, during the battle on the Modder River, to the fact that it was practically impossible for mounted officers to carry orders. He thus expresses himself in his despatch on that battle :—

" Colonel Hall points out it would have been better that he should have known the point of attack; but the truth is, that when no one can get on a horse with any safety within 2,000 yards of the enemy, orders cannot be conveyed, and, personally, I am first to admit I was for most of the day in positions I had no right to be in, because I could only see how the fight was progressing by going to the front."

From a letter written by an officer of the Guards Brigade, and published in the *Times,* we extract the following passages with regard to the battle of Magersfontein :—" What struck me, as at Modder River, was that we received no orders. The major commanding the horse artillery battery knew nothing about the general progress of the action, and did not know on what particular objective he should direct his guns."

---

[1] Extract from " La Guerre au Transvaal," by Lieut.-Colonel Frocard and Captain Painvin.

Thus the Anglo-Boer War had already proved that at 2,000 yards from the enemy it is impossible for a mounted man to move about without being hit by a bullet.

The more recent war in the Far East has merely confirmed the results of the Anglo-Boer War.

The conclusions with regard to the lessons of the Russo-Japanese War, laid down by the Commission under the Presidency of the Grand Duke Sergius Mikhailovitch, Inspector-General of the Russian Artillery, contains the following passages:—

"*The constant maintenance of connection between all portions of the battle-field, now plays a most decisive part.* All commanders should be in incessant communication with one another; infantry and artillery especially should maintain continuous communication. No artillery commander should permit himself to be ignorant of what the infantry was doing, and what it was about to do.

"The *matériel* methods for insuring communication are: the telephone, the telegraph, and various methods of signalling. *The transmission of orders in the fighting sectors, in view of the enemy, by means of orderlies, has become inadmissible; it should be forbidden, as it only results in the useless slaughter of the orderlies.*"

At the same time, the question of the establishment of communications, on the battle-field, between the various units of the command and the neighbouring troops, is one of the most important for solution in modern war. Without such communications the commander cannot know in sufficient time what is taking place at the front of the fight, and is not able to co-ordinate the action of the different units to one common object. On the other hand, communications between neighbouring troops becomes the more necessary owing to the extension of the fronts which separates the units, pursuing that common object, from one another. Finally, the necessity for artillery to frequently make use of indirect fire, requires connection with observation posts, which are often at a considerable distance.

At the very time, however, when the necessity for having excellent communications becomes more and more imperious, the Anglo-Boer and Russo-Japanese wars teach us that the methods hitherto employed tend towards becoming more and more precarious, not to say impracticable. The hail of lead and iron launched by infantry and artillery on the very wide zones of the battle-field, render communication by means of orderlies and staff officers very dangerous or very slow; very dangerous if the connecting link follows the shortest road; very slow if he looks after his own safety in the interests of the duty he has to carry out.

Under these conditions it is of interest to study the methods by which communications were established on the battle-field by the Japanese and the Russians.

JAPAN.

It was reserved for the Japanese to discover a practical method for insuring communication on the battle-field between the various commands and units, viz.: the use of the telephone. At the commencement of the campaign the Japanese only used the telephone to connect the higher commands with one another, with their staffs, with the cavalry pushed in advance, and with captive balloons. This use of the telephone was only practicable at the beginning of the campaign, outside the zone under efficacious hostile fire. The general and his staff took up a position at a point from where they were best able to see, and where communications were easy with the different units of the command. This observation post was established several kilometres in rear of the firing line for the division, and some further kilometres in rear for the army. They there made themselves as comfortable as possible; they brought there powerful stereoscopic, prismatic telescopes, and sometimes tables and chairs. The general and his staff had one or several telegraph or telephone posts. The commander of an army was always connected telegraphically or telephonically with the Grand Headquarter Staff, with all his divisional commanders, and with the commanders of the neighbouring armies. The divisional general was connected with the neighbouring divisions, and often with his brigadiers. By this method the general commanding a large unit, directed it on the battle-field, from his office, as it were.

By means of the telephonic and telegraphic apparatus posts were established, almost instantaneously, no matter where. The working of these apparatus and laying down the lines was easily carried out by the numerous *personnel* available in every division, viz.: a telegraph section of 2 officers and 100 men. When the staffs moved, which occurred rarely, the telegraph trains unrolled after them cable spools, to keep up communication. A general commanding an army thus frequently remained at one observation post for several days.

This highly-developed system of electric communication enabled the Japanese command to work with coolness and efficiency. By never moving, the Japanese generals were enabled to receive, without delay, both the orders of their superiors and the reports of their subordinates. Being thus informed of everything that was taking place along the whole front of the action, there was no occasion for them to go near the firing line in order to gain information themselves. They thus avoided losing contact with the portions of the front hidden from their view, and of attaching an exaggerated importance to what was occurring within sight. Working with coolness, receiving frequent reports, not having their staff officers dispersed as orderlies, the Japanese generals kept their troops well in hand, and could direct them under the best conditions. In addition,

information and orders could be received and despatched in the minimum of time.

Very soon, however, the Japanese recognised the necessity of breaking with the old methods, up to then employed for the transmission of orders up to the firing line, viz., by signallers and mounted orderlies. Each infantry company had, as a matter of fact, signallers, provided with two flags, one red and one white. Their motions corresponded with a certain number of sentences agreed to in advance. At the same time these signallers were employed more at a station than in the fight, for in the latter case their movements drew the enemy's fire. Every infantry regiment had four orderlies, furnished by the divisional cavalry regiments, and a certain number of telephones.

It was especially by means of these telephones that regiments were able to communicate with the general commanding the division, in the zone of efficacious fire. This use of the telephone in the firing line gave excellent results; in spite of the continual movement from front to rear, and *vice versâ*, of infantry, cavalry, and artillery, the telephonic wires rarely deteriorated, and in spite of the din of the battle, telephonic messages were always well understood.

It is evident that the general use of the telephone, even in the firing line, is to be desired. Without doubt, optical signalling has gained in importance since the introduction of smokeless powder; but it entails a great tension of the nerves on the part of those sending and of those receiving signals. An error in transmission or in the interpretation may have the gravest consequences.

Russia.

In Russia the system of flag signalling gave unsatisfactory results, on account of the large number of illiterate soldiers (80 per cent.) in the army. Nevertheless, during the first period of the war in the Far East the Russians recognised to their cost the necessity for establishing constant and rapid connection between the various tactical units, and the difficulty of maintaining that connection by means of mounted orderlies or cyclists when the troops were deployed on ground under intermittent or efficacious fire. Some instructions, too, of the 4th October, 1904, ordered the careful training of a certain number of signallers in the companies, squadrons, and batteries.

During the first period of the war every army corps was provided with a telegraph company, a portion of the engineer battalion of the army corps, which had 90 kilometres of wire, and which was able to establish 8 electric and 2 optical posts. This company was divided into 3 sections, and its effective was 7 officers and 209 men (51 of whom were non-commissioned officers) and 144 wagons. This proportion was soon found inadequate, and during the war a large number of new telegraph units were formed, so that at the end of the campaign

the Russian Army had 24 telegraph companies and 2 mounted units for the 13 army corps, or about 2 companies per army corps.

A telegraph battalion of 4 companies was formed on the 23rd June, 1904; its war effective was as follows: 26 officers, 1,074 men, 745 horses, 160 technical wagons, and 85 transport wagons. Each company consisted of 2 divisions of 2 sections each, disposing of 6 inspectors and 36 working telegraphists, capable of forming 12 telegraphic or optical posts.

A new telegraph battalion of 4 companies was raised on the 22nd December, 1904; its effective composition was the same as for the preceding one. On the 25th November, 1904, and the 11th January, 1905, 3 East Siberian independent telegraph companies were formed, specially told off for wireless telegraphy. Each of these companies consisted of: 10 officers, 2 officials, 426 men (of whom 289 were non-combatants), 258 horses, and 6 Marconi apparatus. Finally, in May, 1905, 2 new mounted telegraph units were raised. These units were for the purpose of rapidly connecting all the chief military authorities by telegraph, telephone, or by optical signals. They were attached to the headquarters of the Commander-in-Chief and to those of the army corps commanders. They were each capable of constructing a line of about 25 kilometres (30 with the reserve) and to simultaneously establish four telegraph, eight telephone, and four optical posts. The effective of these two units, one of which was called "the telegraph half-squadron" and the other "the telegraph sotnia," was: 4 officers, 106 men, 113 horses, and 16 wagons, for the former; and of 4 officers, 101 men, 132 horses, and 11 wagons and 23 pack animals for the latter. Each of these units had two telegraph and telephone sections and 1 optical signalling section.

With large units a superior staff officer is specially charged with connections; the telegraphists and orderlies are in his charge.

From information given by the Russian military Press it would seem that the telephone rendered very great service, and that there was no difficulty in making telephonists both in the infantry and in the artillery.

The Anglo-Boer and the Russo-Japanese campaigns have demonstrated the impossibility of mounted officers and men and of cyclists being able to move about, unmasked in the zone, close to the enemy and under his fire. Consequently means must be sought for maintaining the connection under fire of the various staffs and units.

The transmission of an order or of intelligence from the line of fire towards the rear, or *vice-versa*, is carried out in two different zones: the first, or that nearest to the enemy, on which it is most difficult to show oneself; the second, or that farthest from the enemy, on which it is possible to move about, and to establish the telephone and telegraph.

We will especially consider, in this part of our study, transmission across the first zone; that is to say, from the infantry firing line to the first telephone post, and *vice-versa*. Orders and intelligence to be transmitted are of two different kinds: first, those intended to leave or to enter the zone of fire; second, those sent and received in the zone of fire.

1.—*Communications between Fire-swept Zone and the rear, and vice-versa.*

The following is a summary of the orders and intelligence which it may be necessary to transmit once the fight has commenced:—

Forward;
Break off the action;
More ammunition;
Arrival of infantry ammunition;
You are about to be reinforced;
Increase the artillery fire;
General attack.

This represents seven new signals in the fire-swept zone.

2.—*Communication in the Fire-swept Zone of the Different Units.*

The manœuvre regulations lay down the number of the connecting agents, but fail to point out how the latter may carry out their duty:—

Art. 290.—The quartermaster-corporal, one man per section and a bugler remain behind the captain to transmit his orders.

Art. 295.—The quartermaster-sergeant of each company remains beside the battalion adjutant to transmit the orders of the battalion commander.

Art. 249.—As a rule, every infantry unit, commencing from the battalion, is represented to the commander of the superior unit by a mounted officer, who serves as a connecting agent. The connecting agent, when mounted, may be accompanied by a mounted man or by a cyclist.

In our opinion the means of communication would be possible with regulation signals, by increasing the number of the connecting agents and by the addition of some signals.

Art. 46.—Attention; advance, halt; to the right and to the left; change direction; skirmish; assemble; rally; quicken the pace.

For purposes of attracting attention, the captain's whistle from some distance off is entirely inadequate. It would be necessary to remove the prohibition of Art. 48, viz.: "On the battle-field the use of the bugler is reserved for general officers and, exceptionally, for corps commanders," and to thus leave to the captain the option of making use of the bugler he has near him by employing him only as a means for drawing attention

by blasts, indicating the sections to which the signals are addressed. On the other hand, for receiving signals, every section commander should always have near him a man with good sight who would always keep the captain's group in view for maintaining connection. In the same way the man of each section, placed near the captain, should remain in constant connection with the section he represents. The manœuvre regulations do not forbid it, but they should insist on this point.

The Germans attach the following to section commanders: judgers of distance specially trained to judge from a prone position, and carrying powerful glasses, and who signal to section commanders all incidents occurring in front and on the flanks.

Apparatus for Transmission.—Apparently the most practical one for transmitting signals is the flag. As a matter of fact, all signals should be made from a prone position or from behind cover; it is thus necessary that the signaller should be able to let his signalling apparatus be visible from behind his cover or shelter.

Personnel Employed in Transmission.—Near the section commander: a man (one of the two who should remain in constant communication with the captain's group); near the captain: the bugler who is near him; near the battalion commander: a man and an adjutant.

In addition to the signallers laid down, an equipment should be provided for sending and receiving despatches (Morse telegraph). It should be in visual communication with a post connected with the colonel and telephone station.

Code of Signals. Morse: *a.*

Advance—Twice the letter *a.*
Break off the action—Twice the letter *r.*
More ammunition—Twice the letter *m.*
Arrival of infantry ammunition—Twice the letter *o.*
You are about to be reinforced—Twice the letter *l.*
Increase the artillery fire—Twice the letter *i.*
General attack—Twice the letter *s.*

With these signals the regulation signals suffice to ensure the transmission of orders in the fire-swept zone; these signals would only be for the connecting men placed near section commanders, captains and battalion commanders. At the same time, it would be necessary to add a signal to "cease fire," and another to draw attention to a dangerous direction:—

Look out to the right (left)—Wave the arm or flag to the right (left).

Cease firing—Wave the arm or flag.

The signals addressed to a section would be preceded by a number of blasts from the captain's bugler, corresponding to the number of the section. Those meant for the whole company should be preceded by a prolonged blast.

Defensive.—In the defensive, to these signals, other conventional ones might be added according to circumstances.

At the same time, it goes without saying that, especially on broken ground and in the defensive, it will be easier to arrange for the transmission of orders and information, if not by mounted orderlies, at least by men on foot, who would find their way by making use of the features of the ground. Perhaps even in certain cases the latter method might be employed in the offensive. It is evident that orders or information of exceptional gravity might be inaccurately transmitted by signallers; it will therefore be more prudent to have these carried direct and in writing, to those interested, by a man on foot. As long as the ground is not quite smooth like a billiard table, which is very exceptional, it should always be possible for active men to crawl up to the firing line.

This necessity for establishing communication between the different staffs and units, even in the fire-swept zone—a necessity already demonstrated by the Anglo-Boer war—has decided all the Powers to develop the employment of signalling.

GERMANY.

In Germany, the first provisional signalling instructions appeared in 1902, and were replaced on the 27th January, 1903, by definite regulations on the employment of signals. At the Autumn manœuvres of 1903 the Germans experimented with groups of mounted signallers consisting of 1 officer, 4 non-commissioned officers, carrying flags on their backs, and 1 orderly.

The optical telegraphy used by the Germans during their campaign in South-West Africa gave excellent results. At the commencement of that campaign exclusive use was made of signalling apparatus in service in the Navy, but in August, 1905, the expeditionary force was provided with a detachment of signallers consisting of 9 officers and 200 men, with 71 field signalling apparatus and 36 telegraphs.

Each field signalling apparatus consisted of a heliograph and a lamp, the light of which, produced by oxygen and acetylene, was projected on the receiving post in the form of a cluster by means of a system of lenses. The apparatus in question was able to transmit signals both by day and night, according to the Morse alphabet.

The different signalling parties, from 2 to 3 men strong (in place of the 5 laid down by regulation), had to establish during the march of the column to which they were attached, a line of posts connecting the latter with the rear. When the ground was favourable, the distances between the different posts varied from 80 to 100 and even 160 kilometres, according to circumstances, each post being protected by a group of from 3 to 6 soldiers. The posts sometimes exchanged up to 30 heliograms in 24 hours.

The group of signallers, who are not employed on the permanent lines of communication, accompany the troops, and follow them everywhere. The duty of these groups is to main-

tain communication between the body of troops and the command on the march and in action. With this object the groups endeavour to connect themselves with one of the posts of the permanent network of signalling stations. In a few minutes the signalling apparatus can be removed from the pack animals and set up. The same groups establish connection with the neighbouring columns. On the march and in action they are responsible for the connection between the various fractions of the unit. During the halts the signallers maintain connection between the bivouac, the cattle guard, the water guard, and the sentries. Some companies have two signalling apparati. "It may be stated," we read in the *Militär-Wochenblatt,* "that communications established by signals permit of strong detachments manœuvring separately under one command."

The new German Infantry Drill Regulations contain the following indications concerning communications between the various units of the military hierarchy:—

"The telephone can render great service in linking up the higher *échelons* of the command.

"The decisions to be taken by the commander-in-chief depend on the intelligence he receives about the ground and about the enemy. But often it will only be the commencement of the battle which will inform the chief command with the precision necessary to determine the measure to be taken.

"The duty of all commanders is to maintain order, cohesion, and convergence of efforts in the troops under his command.

"During the whole of an action constant and reciprocal connection should exist between the commander and subordinate units, on the one hand, and between those units, on the other. Every unit commander who makes an important observation should communicate it to the neighbouring units."

In the defensive, "communications will be established by telephone and by signals."

As regards communications between infantry and artillery, the regulations thus express themselves:—

"A close and constant connection should exist between the infantry firing line and the batteries supporting it. The latter will send in advance connecting officers, who will transmit information by signals. . . . Unity of action in an operation is assured by the nature of the duties entrusted to commanders, by strict delimitation of the zones allotted to them, and by the maintenance of close communication to be maintained between the neighbouring tactical units."

Article 221 is thus worded:—"The drummers and buglers are employed during the entire action in connecting by visual observation, the commander of the company and the section commanders. A bugler remains near the company commander; the three other buglers, drummers, or fifers are distributed amongst the sections."[1]

[1] Drummers and buglers should be taught signalling.

Finally, Article 328 is expressed in the following terms:—"A constant connection between the units of the first line of the attacking troops and the commanders of the troops in rear is necessary. Connection by telephone is particularly advantageous. When cover exists, orders and information may, according to circumstances, be equally distributed by mounted orderlies. In other cases the transmission should be made by signals."

The regulations also lay down certain signals for conveying from a distance to the fight, when it is possible, information or orders, for example: increase the artillery fire, re-supply with ammunition, the assault is imminent.

Lieutenant Gentz, of the 2nd (Lorraine) Infantry Regiment, No. 131, has published in the German review, *Jahrbücher für die deutsche Armee und Marine*, a long article on the duty of signallers, from which we extract the following passages:—

"We cannot, in future wars, do without optical telegraphy; we must, therefore, devote the greatest attention to it, and exercise the men more in it during peace time.

"In the fight signallers will be indispensable for the transmission of orders from the rear to the firing line, and *vice versâ*, for the transmission of information from the firing line to the rear. . . . The time when adjutants galloped up to the firing line is over. . . . The signaller may transmit signals in the following positions: seated, kneeling, lying down on his stomach or on his back. Experiments made at Metz have shown that signals sent by a man lying down may be easily understood up to more than 1,000 yards.

"Fighting patrols should make use of signals to rapidly convey the intelligence they will have gathered. . . . In case of necessity, should the men of a patrol have no flags, they might signal simply with their arms.

"According to the Regulations, every infantry company should have, during the greater portion of the year, six more or less expert signallers, without including non-commissioned and re-engaged men, who, when they leave the non-commissioned officers' schools, are almost all conversant with signalling duty."

The ministerial instructions of the 27th January, 1903, to which we alluded above, has been recently replaced by a new regulation, of which the following are the most essential points:—

Signalling patrols are replaced by signalling detachments, which may form two or four posts, each consisting of:—

1. The post commander, who carries a pouch containing telegram forms, envelopes, and pencils;
2. Two men, carrying: the one, field glasses, a map, and a compass; and the other, signalling flags.

An officer, in each squadron or machine gun detachment, and two officers, in each battalion or group of batteries, are trained in signalling. All units of field troops (company, squadron, or battery) must have the *personnel* necessary for the working of a post.

Rigid flags are replaced by limp flags, fixed to a staff, which can be taken to pieces.

The flags and staff are enclosed in a case, carried on the waistbelt by dismounted troops, and fixed to the saddle in the mounted branches. Each post has three flags (instead of the two *red* and *white* ones laid down by the former regulations): a *blue* one for light backgrounds; a *white* one for dark backgrounds; and a *yellow* one used under special atmospheric conditions. With regard to this, Lieutenant Gentz writes in the *Jahrbücher*:—"In practice it is the yellow colour which, in the majority of cases, is most visible." For night work lamps and shutters are used.

The old alphabet, which consisted of a special signal for each letter, is replaced by the Morse alphabet. Abbreviations are laid down for the rapid transmission of information and orders in current use. Finally, the new regulations fix 7 kilometres, instead of 3, as the limit for the employment of signals under favourable conditions.

ENGLAND.

Signalling enjoys great favour in the English Army, and its Signalling Regulations of 1904 consist of over 200 pages. The English use blue flags for light backgrounds, and white flags with blue transverse stripes for dark backgrounds.

The *Army and Navy Gazette*, in its number of the 29th December, 1906, devotes an article to the questions of "Communications in the Field."[1] . . . . .

We may add that during the Anglo-Boer war signallers were frequently most useful to the English. Thus, during the fights on the Tugela the English artillery had great difficulty in ranging because the Boer positions were difficult to locate. It was quite otherwise when on the 29th January the signallers marched with the infantry in the firing line, and were, by means of their flags, able to inform the English batteries on the efficacy of their fire. From that moment these batteries were able to correct their fire with the greatest success.

ITALY.

In the Italian Army great importance is attached to the use of optical telegraphy, which worked with success during the Abyssinian campaign.

---

[1]The author here quotes at great length from the article in question.

DENMARK.

In Denmark the 1884 signalling regulations have been replaced by new ones, which are still kept secret.

SWITZERLAND.

In the Swiss Army a white and red flag is used for signals, 30 centimetres (10¾ inches) wide and 70 centimetres (27½ inches) long, which the man fixes to his bayonet on the rifle. There are altogether 8 signals for transmitting the following messages: 1, attention; 2, nothing new regarding the enemy; 3, cavalry (when the signal "cavalry" is not made), signals 4, 5, and 6 refer to infantry, for which there is special signal; 4, small detachment (patrol); 5, medium detachment (half company or company); 6, strong detachment (battalion or larger unit); 7, direction of the enemy; 8, error.

CONCLUSION.

The experience of the two last wars has demonstrated, as we have said in the course of this study, that in the fire-swept zone it is very difficult, if not impossible, to make use of the following means for the transmission of orders or intelligence: staff officers, adjutants, mounted orderlies, cyclists, etc. In this zone recourse must be had to signalling, and if possible to the telephone. In the zone not swept by the enemy's fire all the methods hitherto laid down by regulation and those which modern science offers us (telegraph, telephone, wireless telegraphy, motors, motor-cycles) may always be employed. As regards the lessons to be learnt from the Russo-Japanese war with reference to communications on the battle-field of the various staffs and units, it might perhaps be imprudent to endeavour to servilely copy the methods used by the Japanese.

We have seen that Japanese Army Commanders frequently placed themselves at a great distance behind the fighting line, and that they directed the operations by means of the telephone. But it should be remarked that the Japanese operations hardly ever came to grief owing to a counter-operation on the part of the enemy. May it not be fairly thought that if the Russians had also manœuvred, the Japanese command, too far away, might in its turn have been at fault?

It may be thought that with the wide extent of battle-fields and the invisibility of the troops, it is impossible to follow the phases of an action by sight. Shrapnel, visible from a great distance, on the contrary, provide a means which has never existed hitherto. Experience has proved that by its means it is possible to calculate exactly the progress of the action and of the density and position of the enemy.

It is thus necessary, more perhaps than ever, that the chief command, by all methods available in peace time, should keep its wits about it, and thus be able by close observation to judge of a situation by means of signs which are still apparent on the battle-field.

At the same time, not being able for the greater part of the time to see more than a portion of the front, generals should have at their disposal an electric network pushed far to the front which will furnish them with a rapid means for communicating with units which cannot be seen from personal observation.

Should the general be obliged to move in order to judge of a situation for himself, a highly developed network of electric communication will greatly facilitate the means for entering into communication with the whole of his available forces, either by means of a telephone line communicating with the point first occupied, or by means of posts which he will find near the subordinate échelons of command.

The employment on a large scale of electric communications seems, therefore, a necessity in modern wars.

THE USE OF THE SKI, OR SKEE, IN FOREIGN ARMIES.

Translated by permission of the Minister of War from the *Revue Militaire des Armées Etrangères.*

Continued from p. 229, and concluded.

Russia.

THE use of the ski is very common in Russia. In the Army its employment is regulated by military districts.

The following, for example, is the course adopted in the Guard Corps and the military district of St. Petersburg.

Marching on skis is taught each year to four men per company in the infantry, and to four or eight men per squadron or sotnia in the cavalry (some cavalry units also instruct their scouts in its use).

No rule or official directions are laid down as to the instruction to be given to skiers, which is carried out under the direction of officers and men already familiar with the use of the ski. Every year, during winter, the skiers take part in two competitions, organised the one by the regiment, the other by the division.

Regimental Competitions.—This is a speed competition. It is necessary, in order to be classed, to have run in half-an-hour at the most a distance of at least 5 versts (3½ miles), as much as possible over level country. Prizes, paid out of regimental funds, are allotted in the proportion of two to each battalion. The men competing must be in uniform, with their cloaks rolled; they carry their rifles and two packets of ammunition (the officers, sword and revolver). On their arrival at the goal the men must be physically in condition to fight, and they are inspected by a doctor who reports on their fitness.

Divisional or Brigade Competitions.—The different units here compete with each other. The competition is carried out by a detachment from each battalion, under the orders of the commander of the detachment.

A distance of from 20 to 25 versts (13 to 17 miles) has to be covered, at a minimum speed of 8 versts (5 miles) an hour. The detachment which first arrives (with at most one man falling out per battalion) is rewarded by and authorised to wear a special badge during the year.

GERMANY.

In the German Army the ski is in use in the 18 Chasseur battalions and in some infantry regiments in garrison in mountainous regions. Each battalion of Chasseurs disposes of 12 pairs of skis; the number of skiers per battalion varies each year according as circumstances are more or less favourable at the time and according to the aptitude of the men serving in the battalion.

There are no special military regulations; battalions are invited to procure Paulke's work on *der skilauf*, and officers and non-commissioned officers who have practised the sport of skiing in their turn teach the men placed under their orders. Sometimes skiers from the battalions (as a rule twenty men in the detachment) go to the mountains and practise skiing in its various forms for eight or ten days.

The ski in use in the German Army is of the Norwegian type. These skis are carried either on the company's baggage wagon or on the men's backs. In this last case the skier's knapsack is on the wagon, and he carries his skis by means of a strap passing over his left shoulder. The military authorities organise no special competitions, but battalions in garrison in the Black Forest or the Vosges are authorised to participate in the competitions of the Black Forest Ski Club and in those of the Vosgien Club.[1]

The programmes elaborated include notably exercises in patrolling, reconnoitring positions, roads, etc., and also endurance races over uneven country.

AUSTRIA-HUNGARY.

For the last fifteen years practice with the ski has been introduced for the infantry corps garrisoned in the mountainous regions of the Empire.

A general instruction relative to the use of the ski was issued in 1896. According to this, every latitude is allowed to the different commanders of the army corps, who settle the number of officers, non-commissioned officers and soldiers to be instructed, appoint the instructors, fix the number of groups to be formed, the method to be followed, the length of the exercises, and determine finally all the details relative to *matériel* and equipment.

The corps where instruction in the use of the ski is most in favour are the 3rd and 14th (Grätz and Insbrück), the 9th (Bohemia), and the 7th and 12th (Transylvania).

[1] The use of the ski is making progress among the Alsatian mountaineers. The Vosgien Ski Club distributes prizes intended to stimulate the mountaineers, who, making the skis themselves, produce the best models. The village and farm children go to the Orbey and Münster schools on skis, and the German forest guards also make use of them.

The men to be instructed are ordinarily grouped by brigade or division, their number varying from 20 to 50 men per group. They are entrusted to instructors generally of the rank of lieutenant, who have the necessary technical qualifications.

This year (1908), with the object of forming a nucleus of good instructors, the Austro-Hungarian Minister of War decided on the organisation of a special ski course for officers. This course, superintended by a captain, lasted five weeks; the class at the end of the course, from the 1st to the 6th March, going up the high mountains in the Hohe-Tauern. The infantry divisions (Common Army and *Landwehr*) of the 1st, 2nd, 3rd, 8th, 9th, 14th, and 15th Corps sent each a subaltern officer. The method of instruction adopted was that of M. Zdarsky, the skier with the highest reputation in Austria, who, moreover, was appointed technical adviser to the officer superintending the course.

The military ski competitions are organised, in Austria, per squad of skiers, on completion of the instruction and in accordance with the programme laid down by the commander of the squad. The soldiers alone take part. The programmes for the competitions consist of speed and endurance trials, as well as employment for purely military purposes.

The victors in the competitions receive small pecuniary grants taken from one of the regimental funds. Officers and re-engaged non-commissioned officers can be authorised individually by the Minister of War to take part in the great ski competition organised each year by the Austrian Tourist Club.

ITALY.

The use of the ski has been regulated in the Italian Army since 1902.

Each Alpine company[1] is to possess among its guides three soldiers trained to the use of the ski (*sciatori*), and for this purpose is supplied with 3 pairs of skis. Each year, during the favourable season, and before the winter marches, the commanders of Army Corps, to which the Alpine troops are attached, organise, either by Alpine regiment or by battalion, a course of instruction for skiers, employing for this purpose as instructors the *personnel* of the corps already trained in the preceding years; each company sends two soldiers to follow the course.

During the winter marches, the *sciatori* are more specially exercised:—1. In scouting duties; 2. In the security service and keeping communication with the columns on march; 3. The occupation of important advanced positions; 4. Dispatch service.

During the same period, the battalions which find themselves manœuvring in the vicinity of each other, frequently

[1] There are, at present, seventy-five Alpine companies, divided into seven regiments of three to four battalions. The four first regiments are stationed in the districts of the 1st Corps (Turin), 2nd (Alexandria), 4th (Genoa), the others on those of the 3rd Corps (Milan), 5th (Verona), and 6th (Bologna).

combine their skiers in a single detachment (sometimes the groups thus formed number more than 80 men), who carry out marches and exercises under the direction of technical officers.

The skis used in the Italian Army are of the Swiss Jakober model; quite recently the regiments have been set to make themselves the skis they require. Whatever may be the number of its battalions, each Alpine regiment receives each year a subvention of 90 lires for the purchase and repair of its skis.

For some years past the Italian Alpine troops have taken part in the ski competitions often organised by the sections of the Italian Alpine Club.

This year (1908), on the initiative of the Count di Robilant, a grand national ski competition was organised and took place on the 8th and 9th February, at Limone, in Piedmont.

By order of the Minister of War, the seven Alpine regiments were represented at the meeting, officers, non-commissioned officers, and soldiers competing.

A cup, offered by the Count di Robilant, was to be presented to the regiment whose champion soldiers succeeded in covering the prescribed distance in the least time.

This cup is to become for a year the property of the winning regiment, and it will be disputed for anew by the different Alpine regiments each successive year.

At the last competition, the regiment which carried it off was the 3rd Alpine; the three successful champions covering the distance, 10 kilometres (6¼ miles), with 700 metres (765½ yards) difference of level, in the mean time of one hour forty-five minutes.

The soldiers who competed were in military uniform, fully equipped.

SWITZERLAND.

In case of mobilisation, the Swiss mountain troops would be supplied with skis. At the present time the supply destined for these troops are calculated for 4 battalions, and allow of 20 pairs of skis with bâtons, 20 snow shoes and 20 combination skis per battalion.

The use of the ski is extending more and more among the country Swiss, so the Military Department has not considered it necessary to organise courses of instruction for the private soldiers; the Department holds, as a matter of fact, that in case of need as many skiers will be found among the soldiers as will be necessary. But, being afraid that there will not be a sufficient contingent of officers and non-commissioned officers, who, for the most part, live in the towns, it has been decided recently to subsidise a course of instruction and competitions for these two categories.

By a decision of the Military Department of the 11th October, 1907, it is stipulated that the Confederation shall subsidise the ski courses organised by officers or non-commissioned officers on the condition that these courses shall not last longer

than 8 to 10 days, and that there shall be a minimum attendance of at least 12 to 15 pupils.

The officer-instructors receive pay at the rate of 8 francs a day, the members under instruction 4 francs. Moreover, each course is granted an allowance of 100 francs for the final competition.

These instructional courses have to carry out a programme which is submitted for the approbation of the Military Department, and includes: theoretical instruction in the services of scouting and security, practical exercises in the country, and instruction on the employment, maintenance, and repair of skis.

The appeal of the Swiss Government has met with approval, and for the winter 1907-1908 the total of the subsidies granted rose to about 20,000 francs (£800), 316 officers and non-commissioned officers having taken part in the courses.

The following is the programme proposed and approved for the course which took place near Gryon:—

Organisation of the Course.—One officer was in charge of the tactical part, another of the technical. There were two classes: one of novices and another of officers already more or less familiar with the use of the ski.

Technical Instruction.—(a) Theory: Instruction in the use, maintenance, and repair of skis, 2 hours; (b) Practical: Progressive exercises in the art of skiing, first over slightly undulating ground with slight gradients, then over more difficult country. The officers learn to climb steep declivities, to leap over obstacles, march in the forest, and to exercise themselves in jumping; at the conclusion they must take part in a long endurance race.

Tactical Instruction.—(a) Theory: Instruction in the service of scouting and security in winter in mountainous country. Map reading of mountainous country; (b) Practical: Instruction confined to novices, nevertheless the excursions from the fifth day include reconnaissances and patrols.

For officers with some experience in the use of the ski, this instruction includes from the third day, patrols, reconnaissances of defiles, and the transmission of orders and reports in a given time.

Detailed Programme.

Days.	Novices.	Trained Skiers.
1st Day	Rendezvous at mid-day. Two hours Theory and two hours practice with skis for all.	
2nd ,, ...	Seven hours skiing and two hours theory for all.	
3rd ,, ...	Nine hours skiing.	Jumping and stopping exercises. Patrols.
4th ,, ...	Nine hours skiing.	Reconnaissance of passes.
5th ,, ...	Reconnaissances.	Transmission of Orders.
6th ,, ...	Patrols.	Patrols with transmission of Orders.
7th ,, ...	Prize Meeting.	
8th and 9th Day ...	Reconnaissance with transmission of Orders.	
10th Day	Excursion in the morning and break-up after mid-day.	

The Engelberg Meeting.—Those taking part were divided into two categories: (a) officers (9 competitors); (b) non-commissioned officers and soldiers (16 competitors).

The distance to be run was 4 kilometres (2½ miles), with 300 metres (984 feet) difference of level. In the course of the run the officers had to fire 6 rounds at a kneeling figure target at 40 metres (43¾ yards); the non-commissioned officers and men 8 rounds at an upright target at 200 metres (218¾ yards).[1] The time of the first officer to arrive at the goal was 46 minutes; that of the first non-commissioned officer 44 minutes.

United States.

No experiments in the use of the ski have up to the present been prescribed by the military authorities, but the cavalry detachment charged with the duty of looking after the Yellowstone National Park have frequently used during the last winter a model ski, due to the initiative of the officer commanding the garrison of Fort Yellowstone.

This ski is made of walnut wood, and is coated with a white alcohol varnish. The ski is attached to the foot by leather straps, laced over the toes and at the heel.

Japan.

The ski is not used in the Japanese Army. However, in the course of the winter 1904-1905, during the Russo-Japanese War, and on the report of a superior Japanese officer then on a mission in Sweden, six pairs of skis were bought in Norway.

Some trials were made in the Island of Yedo, the most northern of Japan. They were not considered conclusive, and the question of the use of the ski in the Army was postponed.

---

[1] At the moment of firing, the competitors were very much out of breath, although they had only had to run over level ground before firing. The result of the firing was satisfactory for the officers (20 hits out of 54 rounds fired), but bad for the men (8 hits only out of 128 rounds fired).

THE PRESENT MILITARY SITUATION IN AUSTRIA-HUNGARY WITH REFERENCE TO SERVIA AND MONTENEGRO.

Translated from the *Internationale Revue über die gesamten Armeen und Flotten*, February, 1909.

Communicated by the General Staff.

AUSTRIA-HUNGARY.

General.

THE threats of war on the part of Servia and Montenegro, which still persist in spite of the understanding which has been arrived at between Turkey and the Austrian Empire, have obliged the Austrian military authorities to adopt special measures both in the annexed provinces and along the frontier line of the Danube and the Save. These measures include the increase of the peace establishment of all troops stationed in the 15th Army Corps district (Sarajevo) and the reinforcement of the higher commands stationed there by one division of troops, organised as two mountain brigades. By this increase in the peace establishments, the fighting strength of the 15th Army Corps has been raised to about 60,000 men.

Reinforcements from the interior have been carried out as follows: each Army Corps in Lower Austria, Bohemia, Galicia, and Hungary has been called upon to send the fourth (or other) battalion of several of its regiments. These battalions have been combined to form two mountain brigades, each consisting of from three to seven battalions and one mountain battery.

Accordingly, the 15th Army Corps is now organised in three infantry divisions (Nos. 1, 2, and 48) with altogether 12 mountain brigades, 1 brigade of mountain artillery of 3 regiments each of 4 batteries, 2 squadrons of cavalry, 2 companies of pioneers, one company of fortress artillery, and 4 mountain train squadrons.

The Zara command, which is under Southern Dalmatia, consists of two mountain brigades.

Thus for operations against Montenegro and Servia there are altogether 14 mountain brigades of infantry ready for immediate service. But this force can hardly be considered sufficient. It is estimated that a campaign in Servia, allowing for the guerilla warfare which might be expected, which would necessitate extensive measures for the protection of the lines of communica-

tion, would require from four to five Army Corps. This, at the normal strength, means 240,000 to 300,000 men. And for operations in Montenegro it is estimated that about 100,000 men would be required.

Therefore, if imminent danger of war should arise, it would be necessary to despatch large reinforcements. In the case of Servia, this would entail no great difficulties. It would hardly be necessary to reinforce the position on the Drina, where some 30,000 men are presumably already stationed. Even should this be necessary, the excellent communications by road and rail would enable it to be done without difficulty. But the despatch of reinforcements for a campaign against Montenegro would be far from easy, even if the navy were called upon to assist.

This is on the assumption that in a campaign against Servia the Austrian main body would advance from Southern Banat, while holding the line of the Drina; and that for an attack on Montenegro, the Austrian scheme is to advance over the Cerna Gora, and from the coast *viâ* Spizza, against the central valleys.

So far as can be gathered from incautious utterances of the Servian and Montenegrin politicians, the strategical plan of these States is to foment an insurrection in Bosnia and Herzegovina, and then, if possible simultaneously, to march across South-east Bosnia on Sarajevo and Mostar, with a connecting line *viâ* Kalinovik.

The Austrian authorities have provided against this scheme by fortifications, by the organisation of a strong frontier force, by establishing frontier patrols, and by reinforcing the troops at the various stations as detailed above. Against Servia it is absolutely necessary to hold the line of the Drina. Therefore the principal points at which the Drina can be crossed, namely, Foca, Gorazda, and Vichegrad, have been fortified and strongly reinforced. The only drawback is that these points of passage lie very far apart, so that their garrisons can hardly support each other, and that north of Losnitza the Servian bank of the Drina commands the Bosnian bank by more than three feet, allowing of the unseen concentration and approach of troops at almost every point, while the Bosnian bank is open and affords no cover.

In case of war, it is probable that the main body of the 48th Infantry Division, quartered in East Bosnia, Banjalka, and Dolna-Tuzla, would advance by Losnitza, sending detachments *viâ* Zvorink and farther north. Such of the forces from Sarajevo as could be spared from the operations on the Rogatica-Vichegrad line would be despatched *viâ Ljubovija*. But it should be noted that the above forces would not suffice to carry out a vigorous offensive movement across the Drina. It is highly probable that the two infantry divisions distributed along the Servian frontier constitute only the advanced guard of the force to be employed, while the main body will be furnished by the adjoining 13th Army Corps, stationed at Agram. This is the more probable since an advance in force of the Servian troops across the Drina will have to be met.

In Northern Servia the strategical conditions are much simpler. Here the Save and the Danube form a barrier so mighty that there can be no question of a strategical raid upon Servia. On the other hand, the conditions are far more favourable for the assembly of large forces of troops; the communications are excellent, and the numerous prosperous villages offer facilities for quartering large numbers of men. The Austrian base, as determined by the roads and supplies, and by the general strategical situation, would probably be Lower Banat, that is the country between Pancsova and Weisskirchen.

Four railways afford access to this base, and the Danube would probably, as in former wars, form an important line of transportation. From this base a favourable line of advance leads through the central valley of the Morava, the granary of Servia and its agricultural centre. Moreover, this line of advance is of great importance on other grounds, because it bounds and confines the area of a war carried on in the open field; it would enable the difficulties of transport to be overcome, and so materially facilitate the operations.

The two lines of advance, by Vichegrad-Cacak and by the Morava Valley, constitute between them the boundary of the probable theatre of war. If the Austrians take the offensive, and succeed in seizing and holding both these lines and the adjacent country, then the Servian field army will find itself cut off and hemmed in in the country to the north and west of these lines, and may be obliged to capitulate.

On other grounds it seems desirable to work up to this solution of the problem of Servian anarchy. Keeping the Servian forces together is the only way to avoid the guerilla war which would afterwards break out. If the Servian army is beaten, and if possible surrounded—and the concentric Austrian lines of operation indicate unmistakably the advisability of attempting this—then the power of resistance of the country will be broken. The Servian peasant is not a warlike person; he submits unwillingly to the burden of taxes and of political warfare carried on by a few agitators in their own interests.

In the Austrian scheme of forcing the Save and Danube, a special *rôle* has been assigned to the Danube flotilla, consisting of 12 ships. We may estimate the strength of the Austrian forces which would be employed at from two to three Army Corps in Banat, one Army Corps in Syrmia, one reinforced infantry division on the Lower Drina, and from two to three mountain brigades in the mountainous district east of Banat, so that the total force brought into the field against Servia might consist of four Army Corps and two infantry divisions, complete in themselves.

As regards the main body of the Servian army, it appears from various sources of information that this will be concentrated in the districts between Valjevo and Uzice, and between Avanjelovac and Swiljainac, with Kragujevac as a fortified supporting point. It would appear that the main objective of the Servian operations will be the invasion of Bosnia, directed *viâ* Vichegrad

and the neighbouring district on Sarajevo. The Servians will endeavour to establish communications with the Montenegrins across the Krbljna, the Montenegrin advance being directed on Mostar. At any rate, the strong forces of troops assembled in the valley of the Western Morava point to such a design. We will not here consider whether a Servian invasion of Bosnia has any prospect of success; but it would be unwise to undervalue the quality of the Servian troops. Servia has been arming since October of last year. Her reservists have been trained by calling them up to the colours for four weeks at a time. She is ordering new rifles, new guns and war *matériel*, and is able to pay for what she orders. Hence we must conclude that Servia will not be beaten for want of warlike stores. Moreover, she has powerful friends.

The possibility of an insurrection in Bosnia and Herzegovina is an open question. But we are of opinion that an Austrian defeat, however slight, would entail serious consequences. Such a defeat, magnified by the Oriental imagination, might be the signal for a general insurrection.

In any case, we must anticipate that if the political situation goes on from bad to worse, that is, if war becomes imminent, Austria will be obliged to despatch still more troops to the frontier. Certainly it would appear easy to keep a watch on the movements of the Servian troops, since these almost always march long distances along main roads and through cultivated districts. On the other hand, little or nothing is to be learnt from the Servian Press regarding the movements of troops, so that, failing a thoroughly organised system of intelligence, there is always a danger of surprise. In contrast to this, every Austrian military measure, down to the minutest detail, is described in the Hungarian papers. In fact, the carelessness or indecision of the Press censors is such that it was possible to arrive at the complete war organisation of the 15th Army Corps from the acknowledgments of the Christmas gifts sent to the soldiers, although this organisation had been kept strictly secret. This is an example of how not to do it!

As regards the military situation between Austria-Hungary and Montenegro, this is much more favourable to Austria, thanks to the extensive military precautions taken since the occupation of Bosnia and Herzegovina. In the latter country the paucity of supplies and of roads, and the difficulties in quartering troops experienced in 1880 led to a number of administrative measures. Efficient means of communication with Austria, both by rail and by sea, were established. A complete network of good roads, available at all seasons of the year, was constructed. In order to facilitate communication by road the water supply was improved and food supplies made available. With the same object in view, a large number of fortified posts were constructed. (*See* this magazine, 1907, p. 204.)

These fortifications enable important points to be held, and constitute safe store-houses and supply depôts for large forces.

They serve as collecting stations for supplies and as starting points and supporting points for operations. They must be looked upon as constituting fortified field bases. Each of the three great frontier fortresses, Bilek, Trebinje, and Cattaro, has a garrison of about 10,000 men, and since the main body of the troops to be employed will be quartered in the country between these fortresses and Mostar, this distribution of troops is very suitable for an advance into this district. The contour of the frontier affords facilities for a concentric advance, which might be made through Foca, Gacko, Bilek, Trebinje, Krivosije, Cattaro, and Budua-Castellastua.

The peculiar character of the Montenegrin mountain country, which is rendered especially difficult by the overhanging cliffs, requires special strategy and special tactical methods in order to cope with the national method of fighting employed by the mountaineers. It may be assumed that the main Austrian objective would be the settlement of Zeta-Moraca, extending from Niksic to Podorica; this is the centre and source of supplies of the Montenegrin power. Although this valley is not more than 30 miles from the Austrian frontier as the crow flies, it would take at least a week to capture the Zeta Valley. For, as experience has shown, long columns often cannot advance more than three miles a day through these mountains. This is due to the necessity of making good the line of communications by the erection of fortified posts and of carrying all supplies, even fuel, water, and forage, on pack animals. The force at present quartered in Bosnia and Herzegovina is only sufficient to maintain possession of these conquered countries and to subdue insurrections. Operations in Montenegro would either have to be undertaken by an additional force of troops or else the troops already in Herzegovina might be employed if they were relieved for the purpose.

Transporting troops in winter by sea and by light railway is no easy matter. This railway is almost constantly snowed up in winter by the heavy snowstorms peculiar to the country. The cold still further reduces the accommodation afforded by the small railway carriages; long trains have in the winter to be divided into several sections, which reduces the daily carrying power of the line. Thus in Southern Herzegovina it is estimated that in winter only from two to three battalions can be transported per day.

Transport by sea is affected by the violent storms known as *boras,* which render it difficult to enter the bad harbours of Southern Dalmatia, so that ships have often to wait for days until the weather is fine enough to unload cargo. This does not apply to Teodo or Cattaro; but circumstances might render it necessary to land troops in the Spizza district, where there are no quays or harbour appliances. And Spizza is especially exposed to invasion from Montenegro. This narrow strip of territory in Southern Dalmatia is connected with Cattaro by the Zupa Plain. At present only one battalion is stationed there, but it will probably be reinforced before long by raising a South

Dalmatian mountain brigade. The original intention was to abandon Spizza in time of war, but it would appear that this decision has been reconsidered on political grounds.

The Austro-Hungarian fleet will play an important part in the defence of Southern Dalmatia. With this object in view, the Winter Squadron has been formed; this consists of a division of the new 10,000-ton battleships, with the cruisers *St. George* and *Kaiser Karl IV.*, besides numerous smaller vessels. A portion of the squadron is already stationed at Teodo and Budua.

NAVAL NOTES.

Home

The following are the principal appointments which have been made :—

Admiral—Sir W. H. May, K.C.B., K.C.V.O., to Command of Home Fleet. Vice-Admiral—G. Neville, C.V.O., to Command of all the nucleus crew vessels of Home Fleet. Rear-Admiral—R. H. Peirse, M.V.O., to be Inspector of Target Practice. Captains—O. F. Gillett to "Warrior"; C. M. De Bartolomé to "Drake"; C. C. Fowler to "Furious"; F. C. Learmouth to "Merlin"; P. H. Colomb to "Encounter"; H. Jones to "Suffolk." Commander—C. H. Fox to "Attentive."

General.—Admiral Lord Charles Beresford, G.C.V.O., K.C.B., will haul his flag down on the 24th inst., on completion of his two years' service as Commander-in-Chief of the Channel Fleet.

The Admiralty have notified the more important vessels of the present Channel Fleet will then form the Second Division of the Main Fleet, under the command of Vice-Admiral Sir A. Berkeley Milne, Bart., K.C.V.O.

Vice-Admiral G. Neville, C.V.O., has been appointed to the command of all the nucleus crew vessels, which will form the Third and Fourth Divisions of the Main Fleet, and his flag will be flown at Sheerness. It is understood that Sir W. May will live on board his flag-ship, and not at Admiralty House, Sheerness, as his predecessor did.

The flag of Vice-Admiral C. H. Adair was struck on board the *Drake* at sunset on the 24th ult., at Portsmouth, and that of Rear-Admiral the Hon. S. C. J. Colville, C.V.O., C.B., his successor in command of the First Cruiser Squadron, was hoisted on board on the following morning.

Rear-Admiral F. T. Hamilton hoisted his flag on board the armoured cruiser *Good Hope* on the 16th ult., at Gibraltar, in succession to Vice-Admiral Sir Percy M. Scott, K.C.V.O., C.B., in command of the Second Cruiser Squadron.

Launch of the "Vanguard."—The new first-class battleship *Vanguard* was launched on the 22nd ult. from the works of Messrs. Vickers, Sons, and Maxim, at Barrow-in-Furness. Her keel was laid on 2nd April last, and her launching weight was 10,250 tons, the greatest weight of any battleship yet launched in England, but is 2,000 tons less than was

Home.

achieved in France, when the battleship *Verité*, one of the six battleships of the *Patrie* class of 14,850 tons displacement, took the water on the 28th May, 1907, from the Chantiers de la Gironde at Bordeaux, with a launching weight of 12,250 tons, all her armour, turrets, funnels, engines and boilers, and military masts being in place, steam even having been raised in the boilers. In the case of the *Vanguard*, the whole of the broadside armour, much of the barbette armour, and some of the machinery, was in place. She will not, however, be running her steam trials within three months of the date of her launch as the *Verité* was.

The *Vanguard* is a sister-ship to the *Collingwood* and *St. Vincent*, which were launched in September and November last, at Portsmouth and Devonport respectively, her dimensions being similar to theirs, viz.:—Length, 500 feet; beam, 84 feet; draught, 27 feet, with an approximate displacement of 19,250 tons. She will be fitted with turbine engines, developing 24,500-I.H.P., designed to give a speed of 21 knots. Her primary armament, like all vessels of her class, will consist of ten 12-inch guns, and for defence against torpedo-boat attack, she will carry a number of 4-inch Q.F. guns.

The *Vanguard* bears one of the most famous names in the annals of the British Navy—a name which, with the launch of the present bearer, has been borne by nine ships. The first, a vessel of 500 tons, built at Woolwich, in 1586, and carrying an armament of 8 demi-cannons, 10 culverins, 14 demi-culverins, with 22 smaller guns, was the flag-ship of Sir William Winter during the fighting with the Spanish Armada, which culminated in the final defeat of the Spaniards in the battle off Gravelines on the 28th July, 1588. The second, a vessel of 650 tons, was Sir Richard Hawkyn's flagship in the expedition against Algiers in 1621. The third took part in the battle off Dungeness, when Blake was defeated by Van Tromp; in the three days' battle with the Dutch off Portland and Beachy Head (18th-20th February, 1653) she bore the flag of General Monck, and as the flagship of Vice-Admiral Jordan took part in the two days' battle off the Forelands on the 2nd and 3rd June of the same year, when the Dutch, under Van Tromp and Ruyter were decisively defeated, and in the final battle of the war on the 1st August, when the Dutch were again defeated, and Van Tromp was killed. The fourth *Vanguard*, a 90-gun ship, built in 1678, was present at the battle of Barfleur, and was lost in the great storm in November, 1703. The sixth of the name was a 74-gun ship, built at Gravesend in 1787, and was Nelson's flag-ship at the battle of the Nile the following year. The last *Vanguard* was an ironclad built in 1869, and was lost by collision in a fog with her sister ship, the *Iron Duke*, when, with the First Reserve Fleet, she was steaming down the Irish Channel; she sank in a little over an hour, all her crew being saved, the sea fortunately being quite smooth.

Result of Test of Gunlayers with Heavy Guns in H.M. Fleet, 1908.—Their Lordships note with satisfaction the further improvement in the results as compared with those obtained in 1907, when the shooting showed an advance over previous years.

The award of the medal will be promulgated in due course.

Home.

		1899	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.
Number of ships that fired ...		136	121	127	139	134	108	100	89	121	117
Number of guns		1,121	1,021	1,137	1,241	1,296	1,171	1,096	1,073	1,365	1,277
Number of hits ...	1906 target	2,831	2,732	3,562	4,789	5,996	5,748	4,374	5,733	7,547	
	1907 "									4,073	4,826
Number of misses	1906 "	6,249	5,709	6,244	6,863	7,028	7,664	3,357	2,328	1,991	
	1907 "									5,465	4,183
Excess of hits over misses	1906 "	Nil	Nil	Nil	Nil	Nil	Nil	1,017	3,405	5,556	
	1907 "									Nil	643
Excess of misses over hits ..	1906 "	3,418	2,977	2,682	2,074	1,032	1,916	Nil	Nil	Nil	
	1907 "									1,392	Nil
Percentage of hits to rounds fired	1906 "	31·1	32·3	36·3	41·1	46·04	42·86	56·58	71·12	79·13	
	1907 "									42·70	53·57
Hits per gun per minute:—											
12-inch and 10-inch	1906 target	·29	·30	·33	·38	·53	·47	·58	·81	·61	
	1907 "									·40	·56
9·2-inch ...	1906 "	·23	·22	·31	·35	·70	·73	1·40	2·84	3·25	
	1907 "									2·01	2·20
7·5-inch ...	1906 "									3·48	
	1907 "									1·58	2·51
6-inch Q.F. and B.L.	1906 "	1·05	1·51	1·81	2·41	2·63	2·63	4·14	5·68	5·93	
	1907 "									3·32	3·96
4·7-inch and 4-inch Q.F. ...	1906 "	1·82	1·60	1·93	2·02	2·47	2·28	3·73	4·96	5·73	
	1907 "									2·38	3·32
Number of ships from whom no returns were received.		32	29	47	19	30	43	Nil	Nil	3	8

Order of Merit.	Fleet or Squadron.	No. of Ships.	No. of Men Firing	Points per Man.	First Ship in Fleet.	Scores.
1	CHINA	6	74	63·617	*King Alfred* ...	71·18
2	Channel and First Cruiser.	20	284	50·981	*GOOD HOPE*	81·33
3	CAPE OF GOOD HOPE.	3	29	48·309	*Hermes* ...	61·40
4	Home and Fifth Cruiser.	38	394	48·124	*Argonaut* ...	79·14
5	Atlantic and Second Cruiser	11	142	41·740	*Exmouth* ...	65·77
6	Mediterranean and Third Cruiser.	14	172	40·998	*Canopus* ...	55·53
7	Special Service, Tenders, etc.	13	68	38·932	*Cadmus* ...	73·22
8	East Indies	3	27	33·466	*Proserpine* ...	39·23
9	Australia	8	79	33·040	*Cambrian* ...	42·79
10	N.A. and W.I. and Fourth Cruiser.	1	8	26·055	*Brilliant* ...	26·06
	Total, 1908 Test ...	117	1,277	45·775		
	Total, 1907 Test ...	121	1,365	36·884		
	Difference	—4	—88	+8·891		

France. The following are the principal appointments which have been made :—

Capitaines de Vaisseau—A. M. Ytier to the Command of a Division of the Squadron of the North; R. C. Le Nepvou de Carfort to "Marceau" and Command of Torpedo School; H. E. Campion to "Ernest-Renan." Capitaines de Frégate—E. L. Rey to "Lance" and Command of 2nd Ocean Torpedo Flotilla; A. A. De la Taste to "Vinh-Long"; L. L. Bréaubert to "Pourvoyer" and Command of Naval Division in Madagascar. —*Journal Officiel de la République Française.*

The Charcot Expedition.—News has been received from the Charcot Antarctic Expedition all well on board. M. Charcot, with the *Pourquoi-pas, left* Punta-Arenas, Straits of Magellan, early in December, and proceeded to Orange Bay, where he was awaiting favourable weather to start for the South. His intention is to go first to Deception Island, and from there to Port Lockroy, in the Roosen Straits, Palmer Archipelago; he will stay here a fortnight to take observations, etc., and then proceeding by Wandel Island he will work along Graham's Land, and try to reach Alexander I. Land; there he will go into winter quarters and make inland expeditions over the ice, and also explore the coast line.

The "Jules Michelet."—A valuable addition to the strength of the cruising division attached to the Mediterranean Squadron, has been made by the substitution of the new armoured cruiser *Jules Michelet* for the *Condé.* The *Jules Michelet* has recently successfully completed her trials with a speed endurance trial run between Lorient and Toulon, which included a 24-hours' run at full speed under natural draught. She left Lorient on the 13th of December, arriving at Toulon on the 17th, having covered a distance of 1,680 miles, and a mean speed for the whole run of from 18 to 19 knots being maintained. On her earlier trials, during a 6-hours' run, with the engines developing 7,700-I.H.P., and making 85 revolutions, her average mean speed was 16·4 knots, on a coal consumption per I.H.P. per hour of 680 grammes (1 5-16 lbs.); during a 24-hours' run, with the engines developing 16,750-I.H.P., and making 109 revolutions, a speed of 20·1 knots was maintained on a coal consumption of 740 grammes (1½ lbs.) per I.H.P. per hour; at the trial at three-quarter power, with 15 boilers alight out of her 20, the engines developed 29,000-I.H.P., which is the contract power required, the coal consumption being 930 grammes (2 lbs.) per I.H.P. per hour, her contract speed of 22 knots being easily exceeded; while during the 10-hours' run at full speed, the I.H.P. developed was 30,000, and a speed of 23·2 knots was maintained, or more than a knot over the designed speed. The ship is fitted with the Guyot-Du Temple small tube type of boiler, which has given very successful results in the French Navy.

Considerable alterations in the plans of the *Jules Michelet*, as at first designed, have been made, especially in the superstructure, and she is the first vessel of this type designed to be manœuvred entirely from the conning tower in peace time, her upper bridge and charthouse having been removed, as well as the fighting top. These alterations are the outcome of proposals made by the *Commission pratique d'études d'Artillerie Navale*, and will probably be introduced in all the new ships, and give

France.

the cruiser quite a different appearance from her predecessors. The alterations in the superstructure have also been accompanied by changes in the interior arrangements for fire control.

The "Farfadet."—The submarine *Farfadet*, which foundered in Bizerta Harbour, in July, 1905, and which was afterwards salved and sent to Toulon for repairs, was launched for the second time on the 17th December last from the Mourillon dock. The *Farfadet* has been specially fitted out for submarine salvage work, and since her launch has been carrying out a series of successful experiments.—*Le Yacht* and *Le Temps*.

Précis of M. Chaumet's Report on the Estimates: Present State of the French Navy.—M. Chaumet, the Reporter to the Chamber on the Estimates for the current year, takes a rather pessimistic view of the naval position of France, as it stands to-day. He draws attention to the fact that, although the official list of effective ships presented to Parliament makes a brave show on paper, it proves in reality to be quite illusory as to the real strength of the fleet when it is carefully analysed. M. Chaumet points out that there are difficulties in estimating the true effective value of ships, and he proceeds to apply the age test, as formulated by Germany, which, in the case of battleships, gives a life of twenty years.

Battleships.

According to the official Return attached to the Budget, there are at present, reports M. Chaumet, 19 battleships shown on the effective list of the Navy. Of these, one, the *Redoutable*, is in reserve at Saigon, where she does duty as a depôt-ship; she was launched in 1876, and her contemporaries have all been for some time struck off the effective list, and she herself is quite obsolete and of no practical fighting value.

Two others, the *Brennus* and the *Hoche*, are also shown as in the reserve. The *Brennus* was launched in 1891, and was, in her day, a most powerful unit; although of an obsolete type, she might still, with a certain amount of repair, do good service for some years yet. The *Hoche*, launched in 1886, has already exceeded by more than two years, the age limit. She belongs, moreover, to the type which may be termed "capsizable." Her original speed was 15·5 knots, but she cannot realise anything near that. Instead of being a source of strength to a squadron, she will be one of danger.

There remain 16 other battleships.[1]

Of these, 12 constitute the Mediterranean Squadron. There come first the six battleships of the 1900 Programme, the *Patrie*, *République*, *Démocratie*, *Justice*, *Liberté*, and *Verité*, forming the first two divisions of the squadron, which are all ships capable of holding their own against foreign contemporary vessels; they are, for the present, the best ships in the fleet. Next comes the *St. Louis* (1896) and her two sisters, the

[1] The dates against the ships' names are the dates of their being launched.

France.

Gaulois (1896) and *Charlemagne* (1896); the *Bouvet* (1896), *Suffren* (1899), and the *Masséna* (1895), which form the other two divisions of the squadron. None of these last six have passed the 20-year limit, and they may all be considered as still possessing a certain fighting value. There are yet three others at Toulon, the *Charles-Martel* (1893), the *Jauréguiberry*[1] (1893), and the *Carnot* (1894). They are not fighting ships of the first rank, but they can, nevertheless, render service. The *Marceau* (1887) is employed as the sea-going torpedo school-ship, but as she is more than twenty years old, she finds no place on the list.

We can only count, then, on 15 battleships, fit to be placed in the battle line, and these are of very unequal value, and only seven are less than 10 years old.

Coast-defence Ships.

After the battleships, 9 coast-defence ships appear on the list, which are all stationed at Cherbourg and kept in the "urgent" Reserve.[2]

The *Henri IV.*, launched in 1899, has, until quite recently, been reckoned among the battleships. She is of a special type, and of greater tonnage than the other coast-defence ships (9,000 tons in place of the 7,500, 6,000, and 5,000 tons of the others); she has a greater radius of action and a higher speed (17 knots as against the 14 to 15 of the earlier vessels). Among the remainder, the *Furieux* (1883), *Indomptable* (1893), *Caïman* (1885), and the *Requin* (1885), have all passed the age limit; they have no great speed, and their radius of action is very limited.

The *Bouvines*, *Jemmapes*, and *Valmy* (all 1892), and the *Amiral-Tréhouart* (1893), have still from four to five years to run. But they have the same fault as the earlier vessels of the class, they are all "capsizable," and are nick-named in the fleet the "*Nebogatoffs*." The General Staff, however, hope to be able to utilise them. However this may be, it is impossible to include them in the offensive fleet, and, with the *Henri IV.*, they must be kept on a special list.

Armoured Cruisers.

According to the official Return, we have 21 armoured cruisers, of which 15 are in commission and 6 in reserve.

In commission we find:—

In the Mediterranean Squadron, the *Jules-Ferry* (1903), *Victor-Hugo* (1904), *Jules-Michelet* (1905), *Gloire* (1900), *Amiral-Aube* (1902), and *Condé* (1902).

In the Squadron of the North, the *Léon-Gambetta* (1901), *Ernest-Renan* (still on her trials), *Marseillaise* (1900), *Montcalm* (1900), *Amiral-Gueydon* (1899), and *Dupetit-Thouars* (1901).

---

[1] The *Jauréguiberry* has since replaced the *Masséna* in the Mediterranean Squadron, which latter ship is to be attached to the Gunnery School; similarly the *Charles-Martel* is to be attached to the Torpedo School.

[2] The ships in the *réserve normale urgente* are ships kept in reserve in the dockyards, but ready for sea at 24 hours' notice. Their captains, one lieutenant, the chief engineer, and a reduced crew are kept on board.

France.

The *Bruix* (1894) is in the Far East. The *Pothuau* (1895) is the sea-going gunnery ship, but she can be counted as fit for service. Similarly we can include the *Edgard-Quinet*, although she is not yet completed.

To these 15 cruisers we may add the six in reserve, as they are all below the age limit of 20 years. These are the *Amiral-Charner* (1893), *Kléber* (1902), *Jeanne d'Arc* (1899), *Dupuy-de-Lôme* (1890), *Desaix* (1901), and *Dupleix* (1900). Four of these armoured cruisers are more than ten years old, but they can all be classed as quite effective, in spite of certain defects, which are apparent in the most recent types, such as their too great length in comparison with their beam, weakness in their scantlings, and the bad design of the form of the after part of their hulls.

Protected Cruisers.

No amount of optimism, however, can attribute any fighting value to the 25 non-armoured cruisers of the 1st, 2nd, or 3rd classes, even to those of recent construction.

Nobody would venture to place, even those in the 1st class, in the fighting line. They are merely "mail boats," weighted with an armoured deck, which affords very insufficient protection against an enemy's projectiles. They can only be employed on peace duties or in operations of war against countries possessing no navy, such as Morocco, and it is for these purposes that they are being used.

The *D'Entrecasteaux* (1896), with a 19-knot speed, is in the Far East; the *Jurien-de-la-Gravière* (1899), with a 22-knot speed, is in the Pacific. In the ordinary normal reserve are the *Guichen* (1897) and the *Chateaurenault* (1898), both with a speed of 23 knots.

What has been said about the 1st class cruisers applies with even greater force to those in the 2nd and 3rd classes. There are eleven in the 2nd class, of which one, the *Protet*, has a speed of 20 knots, seven others 19 knots, and the remaining three 18 knots. With the exception of the *Chateaurenault* and *Jurien-de-la-Gravière* in the 1st class, and the *Protet* in the 2nd, all these cruisers are more than 10 years old.

The ten 3rd class cruisers can be usefully employed on special service, such as Fishery Protection duties off Newfoundland and Iceland, but they cannot fight, and are quite incapable of performing scouting duties, for which our so-called *avisos* also are quite unfit.

The armoured and other gunboats which figure on the list, may be employed for local defence in certain of the Colonies, but can hardly be included among the effective naval forces of France.

The Flotillas.

There remain the flotillas, represented for destroyers and torpedo boats by 351 units, for submarines and submersibles by 68 units. To appreciate the value of these units, independently of their good qualities or special defects, we must consider their age. If a battleship has to be struck off the effective list after 20 years, it must be at once admitted that after 10 years both torpedo boats and submarines have lost, in a great measure, their effective fighting value.

Following this principle, we shall consider as non-effective the six torpedo-avisos *Flèche*, *Bombe*, *Sainte Barbe*, *Couleuvrine*, *Dragonne*, and *Lance*, the first five of which date from 1885, and the last from 1886, as

France.

they have all exceeded the age limit allowed for battleships, and at their best never steamed more than 18 knots.

There are 71 destroyers; 31 of which are in commission and attached to squadrons, 12 are in reserve, and 28 are attached to the flotillas.

Twelve are nominally attached to the Mediterranean Squadron, of which one, the *Faucon*, dates from 1887, with a speed of only 17 knots, and another, the *Lahire*, from 1898, with a speed of 22 knots; the remaining ten are new vessels steaming about 28 knots. To the Squadron of the North are attached 18 destroyers; these with the exception of the *Cassini* which dates from 1894, are all new vessels. Deducting the *Faucon*, *Lahire*, and *Cassini*, we have 28 good destroyers out of the 31 shown as attached to the Mediterranean and Northern Squadrons.

Of the 12 destroyers in the reserve, one, the *Epervier*, dating from 1886, with a speed of only 16 knots, is to be struck off the list; two others, the *Casabianca* and *D'Iberville*, which date from 1895 and 1893, respectively, with a speed of 21 knots, can be utilised as repeating vessels; the remaining 9 are all, comparatively speaking, new vessels.

Of the 28 affected to the different flotillas, all are new with the exception of the *Dunois*, which dates from 1897; as she is a vessel of over 900 tons displacement, she ought to be placed among the vessels for service on foreign stations or special duties. We thus have a total of 64 effective destroyers, with displacements averaging from 300 to 330 tons, and mean speeds of from 28 to 29 knots.

There are four *torpilleurs de haute mer* employed on special service, but they all exceed the 10-years age limit, and of the remaining 29 on the list, there are only 11, which are under 10 years, many of the remaining 18 being over 15. The mean displacement of the 11 in question is from 160 to 180 tons, with a speed of from 28 to 30 knots.

Of the 224 1st class torpedo boats, 62 with a displacement of 80 tons and speeds of from 21 to 23 knots must be struck off. There remain, including 22 on Colonial service, 162, with displacements from 87 to 98 tons, and speeds from 24 to 27 knots. All the 2nd and 3rd class torpedo boats and the so-called vedette-boats, must be struck off the list, as they are not fit for war, although they may still be used for training purposes.

As regards the 30 submersibles and 38 submarines, these may all be considered effective, although there are many among them of no great fighting value, at least, as far as taking the offensive goes.

No apology is necessary for having subjected the official returns of our effective fleet to the searching analysis given above. As the result of this analysis, the real effective strength of the fleet is as follows :—

Battleships	15
Coast-defence ships	5
Armoured cruisers	21
Destroyers	64
Torpilleurs de haute mer	11
Torpedo boats	162
Submersibles	30
Submarines	38

—Rapport par M. Charles Chaumet (Budget Général de l'Exercice, 1909, Ministère de la Marine).

(To be continued.)

MILITARY NOTES.

Home. The following are the principal appointments which have been made :—

Regular Army.—Major-Generals—H. J. Scobell, C.B., to Command Cape Colony District; W. P. Campbell, C.B., to Command 5th Division.

Territorial Force.—Colonel—F. Lloyd, C.B., D.S.O., to Command a Division, with temporary rank as Major-General.

Indian Army.—Major-General—W. du G. Gray, C.B., to be Inspector-General of Volunteers.

To be Brigade Commanders:—Colonels—J. S. Cowans, M.V.O., with temporary rank as Brigadier-General; H. Bower, with temporary rank as Brigadier-General.

Memorandum of the Secretary of State Relating to the Army Estimates for 1909-10.—Total Estimates.—The total of Army Estimates for 1909-10 is £27,435,000, a decrease of £24,000 as compared with 1908-09. This small difference, however, is the resultant of considerable variations in both directions. I have had to provide for increases under the following heads :—

	£
Growth of Territorial Force (Vote 4)	355,000
Growth of Army Reserve	25,000
Increase of Pensions	96,000
Increase of Loan Annuities	32,000
	508,000

These increases have been met, in the main, by the economies resulting from the return of troops from South Africa, and by the receipt of an increased contribution from the Indian Government towards the cost of raising and training the British force in India.

The payments hitherto made by India under this head rest on the basis of the awards made by Lord Northbrook's Commission in respect of the years 1879-1890, a basis which, owing to the many changes in the organisation and cost of the Army, had long been completely out of date. A Committee, presided over by Sir R. Romer, was appointed in 1907 to consider the revision of the basis, and reached a decision upon the questions of principle involved, after the estimates of 1908-09 had been prepared. The findings of this Committee enabled my colleague, Lord Morley, and myself to come to an agreement under which the annual sum to be paid by India towards the reimbursement of the expenditure from Army Votes was increased by £300,000.

The growth of Loan annuities arises from the fact that, though the policy of providing for fresh works by borrowing money was definitely

Home.

abandoned in 1906, there yet remains under the arrangements then made a small amount of money to be raised and spent in completing services in hand under the original programme. The further growth of the charge under this head will, however, not be large, while the annuities created under the Barrack Act of 1890, amounting to some £300,000, will come to an end in 1910-11.

Establishment and Strength of the Regular Army.

There is a reduction of 1,800 men on the establishment, owing to the return from South Africa of a Cavalry regiment and four battalions of Line infantry, with the consequent restoration of the balance between the numbers of units of those arms abroad and at home, which is the ideal of the Cardwell system. The effect is seen in the disappearance of the Provisional Cavalry depôt, the Provisional Battalion of Infantry, and the enlarged Infantry depôts, formations which were costing some £84,000 a-year, and adding nothing to the fighting strength of the forces at home; while now every recruit taken for these arms helps from the first to maintain a fighting cadre.

Recruiting for the Regular Army has been remarkably brisk, with the result that the recent serious depletion of the ranks by the efflux of 3-years' men to the Army Reserve has been made good (except for a small remaining deficit in the Field Artillery), and the standard of height has already been raised for both Garrison Artillery and Line Infantry—the latter to the level at which it stood before the war.

Field Artillery.—It will be remembered that in order to provide the men required on mobilisation for the ammunition columns of the Field Artillery, 33 batteries surplus to the requirements of the Expeditionary Force were converted into 11 Training Brigades, a large proportion of their rank and file being replaced by Special Reservists under training. This scheme has met with a considerable measure of success, over 9,000 Special Reservists (including 6,500 transferred from the Militia Garrison Artillery) having been obtained. Experience has, however, shown that it is doubtful whether the full numbers of Special Reservists required (about 15,000) would have been obtained without diverting recruits from the Infantry, and that, if they were, more Training Brigades would be wanted to give them thorough training. At the same time the General Staff has advised that it is necessary to add six more batteries of howitzers to the Expeditionary Force, thus reducing the number of Training Brigades available to nine, and at the same time further increasing the number of men to be found on mobilisation. These and other considerations have led to a thorough re-examination of the whole question, with the result that it has been decided to allow the number of Special Reservists to fall ultimately to 6,000, and the number of Training Brigades to 6, maintaining at home a regular establishment of 5,000 3-years' men for reserve-producing purposes in addition to the number of 6-years' men (about 9,600) necessary to find the drafts for India and the Colonies. Of the 99 Field batteries at home, 72 will thus be appropriated to the Expeditionary Force, and 18 to the Training Brigades. The remaining nine will assist in training 3-years' men for the regular reserve, will serve as centres of instruction for the Territorial Field Artillery, and will be available as reinforcements in case of emergency. Of the 2,400 men of the Field Artillery shown in last year's

Home.

Estimates as excess numbers temporarily retained until Special Reservists should have been trained to replace them, all but some 400 will now be permanently retained. As the enlistment of 3-years' men will not begin to increase the regular reserve until 3 years have elapsed, the establishment of Special Reservists is maintained for the present at 12,000. This reorganisation not only involves no increase of expenditure, but results in a substantial saving.

Present Position on Mobilisation.—At the present date, fully trained men are available to mobilise and maintain in the field for six months the Cavalry Division, complete with its due proportion of other arms, and the Infantry of the six Divisions. The other fighting units of the six Divisions can also be completed on mobilisation, but there are still deficiencies in two Divisions in the Army Service Corps and the partially trained men required for medical units, and in the artillerymen required for ammunition columns and to supply the waste of war. The machinery for completing all these deficiencies has been organised and is at work.

Loss by Disease.—The time has come when we may gauge the results on the health of the Army of the reforms in the Royal Army Medical Corps which were instituted in 1902. We are sufficiently removed from the disturbing influences of the South African War upon the normal statistics, to be able to contrast the wastage from deaths and invaliding at the present day with that of the period preceding the war.

A comparison of the hospital admission rates, death rates, rates of invaliding and constantly sick rates of the first and last years of the decennial period 1898-1907 in India, in the United Kingdom, and in the Colonies is given in the following tables :—

India.

Year.	Hospital admissions per 1,000.	Deaths per 1,000.	Invalids sent home per 1,000.	Invalids finally discharged the Service per 1,000.	Constantly sick per 1,000.
1898...	1,454	20	39	19	90
1907...	756	8	25	8	46

Colonies.

1898..	1,000	13	44	11	60
1907...	502	5	19	9	32

United Kingdom.

1898...	649	3	—	17	37
1907...	438	3	—	14	24

It should be mentioned that the fall in the Admission and Constantly sick rates is not to be attributed wholly to diminished incidence of disease. It is partly due to an administrative improvement by which men with slight ailments are not removed to hospital but are treated in barracks as

Home.

out-patients. But the lowered death and invaliding rates show the true effects of efforts at disease prevention. The same results are shown, for specific diseases, in the curves published in the Army Medical Department Report for 1907-08.

And this improvement is not only welcome as indicating increased well-being for the soldier: it also means reduction in the number of hospital beds necessary, less men maintained in peace to produce a given number fit for war, smaller annual drafts to be sent out by the home units; in fact, an all-round saving in the cost of the Army.

Special Reserve.

In the calendar year 1908, 48,746 men transferred from the Militia to the Special Reserve, and 26,069 fresh recruits were obtained, of whom 8,288 enlisted in the last quarter of the year. Recruiting continues to be good, with the result that the Infantry of the Special Reserve on 1st February, 1909, was within about 3,300 of its full establishment of 58,500 men.

In addition to the Special Reservists of the Artillery, Engineers and Infantry, who are drilled on enlistment for six months, Special Reservists of a less highly-trained type are required in war to supplement the regular *personnel* of the Army Service Corps and Royal Army Medical Corps in the Expeditionary Force. These men are obtained from the Territorial Force, being borne supernumerary to its establishment and, after reaching a sufficient standard of training, receive a yearly bounty in return for undertaking liability for foreign service in war. The progress made with the formation of Territorial units of these arms during 1908 was sufficient to justify the opening of enlistment for these Special Reservists. At the same time, to accelerate the completion of the *personnel* of the Expeditionary Force, and in view of the plentiful supply of recruits of the "Militia" type, it was decided as a temporary measure to take a limited number of Special Reservists for these arms to do a period of drill on enlistment. Provision will consequently be found in the Special Reserve Establishments at page 46 of the Estimates for Army Service Corps and Royal Army Medical Corps men of both types.

Territorial Force.

The Territorial Force came into being on 1st April, 1908. The existing Yeomanry and Volunteers were given until 30th June to transfer to the new Force. The strength of the Yeomanry and Volunteers on 31st March had been 9,174 officers and 241,085 men. On 1st July the strength of the new Force, including both transfers and recruits, was about 8,000 officers and 176,500 men. Of these some 112,000 men had joined for one year.

Since the close of the camping season, recruiting has proceeded at about three times the accustomed rate of the Yeomanry and Volunteers, and on 31st December, 1908, the strength of the force was 8,623 officers and 199,059 men. Out of the 897 units of which the Force is composed, only 24 had failed to secure official "recognition," owing to their having less than 30 per cent. of their establishment.

Home.

The total number of officers and men who attended camp was 174,293, of whom 69,007 went for 8 days and 105,286 for 15 days. During the second week of their fortnight's camp, the South Midland Division were concentrated and took part in divisional manœuvres on Salisbury Plain. The whole force trained under the general supervision of the General Officers Commanding-in-Chief, and of its own General Officers Commanding, and the reports received of the training were of a highly satisfactory nature.

Besides the appointment of General Officers Commanding and of their General Staff Officers to the 14 Territorial Divisions, each Division will shortly have appointed to it a C.R.A. These General Officers Commanding and their staffs have made a good start with instructional work. During the past winter they have instituted and carried on a large number of schools and courses of instruction which have been largely attended by officers and non-commissioned officers. A new musketry course has been most carefully worked out with the view of obtaining the maximum amount of value and instruction for the rounds fired, and is now in operation. Regulations for the Territorial Force were issued shortly after the Force came into existence. Mobilisation Regulations, containing the complete scheme of mobilisation as worked out in detail by the General Staff, and showing all the requirements of the Force on mobilisation, have also been issued.

It has been decided that the Territorial Force may carry colours on the same lines as in the Regular Army. A Territorial decoration has been approved for the officers and a medal for the men.

The work connected with the administration of the Territorial Force has been heavy. The entire work of administration was handed over to the County Associations on 1st April, 1908, and they have rendered most valuable services, entailing a great expenditure of time and labour. One of the largest questions with which they have had to deal has been the provision of drill hall and other accommodation for the Force. This necessitated a large amount of new construction, and in many cases the adaptation or repair of what was already in existence. A number of new drill halls and headquarters have been approved, and in several cases riding schools for the use of the mounted branches have been sanctioned. Good progress is being made with this work, though it will take some time to complete.

The novel financial system under which the affairs of the Force are conducted was designed to place the responsibility for efficiency and economy of administration in detail upon Associations and (as regards funds for training) General Officers Commanding, while retaining the necessary control over the total charges against the public. Until the accounts of the first year have been prepared and audited, it would be premature to speak with certainty as to the sufficiency in all respects of the various grants made from Army funds, but from the information at my disposal I have not thought it necessary to provide for any considerable revision of the amounts of the grants.

The equipment of the Force up to the standard required for training is being pushed forward, and it is intended that the necessary equipment shall be available for all units next training season. The conversion of the 15-pr. field guns will be practically completed by the end of the present financial year.

Home.

There is every indication that the Territorial Force is making substantial and satisfactory headway in the country. Thanks chiefly to the efforts of the Associations, it is receiving support from many who have not hitherto identified themselves with the military forces of the Crown. In particular, many large employers of labour, both public and private, are granting their employés the most generous facilities for attending camp. A general interest in the Force has been awakened throughout the country; a considerable number of men whom the old Volunteer organisation does not appear to have reached are coming forward, recruiting is particularly brisk in consequence, and the class of men presenting themselves for attestation is exceptionally good.

I announced some time ago that I had felt able to transfer the Department of the Territorial Force from my own immediate personal supervision to that of the Civil Member, who now directly represents it on the Army Council.

An Advisory Council, representative of the higher Military Commands, the County Associations and the Territorial Force, has been formed to assist in keeping the Army Council in touch with the Force.

Horses.

Much attention has been devoted in the past year to the difficult question of horse supply in war, both for the Regular Army and the Territorial Force. It is evident that the indispensable basis of any scheme must be the possession of accurate information about the number of horses of the several classes required for military use, in each district. It is proposed to take a census of horses throughout the country, by co-operation between the County Associations and police authorities, and arrangements have already been made for a trial of the plan.

Measures are also in progress for ensuring that sufficient numbers of properly trained animals are always available for the Regular Cavalry both during the training season and on mobilisation for war.

Quick-Firing Howitzers.

The experiments which have been proceeding for some time past have now resulted in the approval of an improved and more powerful pattern of Field howitzer; and provision is made in these estimates for very substantial progress with the manufacture of those required for the equipment of the Expeditionary Force, each division of which will in future include a brigade of three batteries of these weapons.

Pensions.

There is again an increase in the Non-Effective Votes of £96,000. The larger part of this is due to the abnormal number of non-commissioned officers pensioned in connection with recent reductions of the Army; but in view of the representations which have been made from many quarters I have also provided a sum to admit of the commutation of soldiers' pensions at an earlier age than at present. The pensioner will still have

Home.

to satisfy the Army Council and the Commissioners of Chelsea Hospital that it is distinctly and permanently to his advantage to commute, and at least 1s. a-day will still have to be left uncommuted; but the present age limit of 50 will no longer be insisted upon.

R. B. H.

February, 1909.

ABSTRACT OF ARMY ESTIMATES, 1909-10.

Nos.—Votes.		Net Estimates.		Increase on Net Estimates.	Decrease on Net Estimates
		1909-10.	1908-09.		
	I.—Numbers.				
A	Number of Men on the Home and Colonial Establishments of the Army, exclusive of those serving in India ...	Total Numbers. 183,200	Total Numbers. 185,000	Numbers. —	Numbers. 1,800
	II.—Effective Services.	£	£	£	£
1	Pay, etc., of the Army	8,527,000	9,422,000	—	895,000
2	Medical Establishment :—Pay, etc.	440,000	451,000	—	11,000
3	Special Reserves	897,000	840,000	57,000	—
4	Territorial Forces	2,307,000	2,005,000	302,000	—
5	Establishments for Military Education	146,000	142,000	4,000	—
6	Quartering, Transport, and Remounts	1,665,000	1,839,000	—	174,000
7	Supplies and Clothing	4,275,000	3,912,000	363,000	—
8	Ordnance Department Establishments and General Stores	535,000	498,000	37,000	—
9	Armaments and Engineer Stores	1,644,000	1,490,000	154,000	—
10	Works and Buildings	2,551,000	2,515,000	36,000	—
11	Miscellaneous Effective Services	67,000	73,000	—	6,000
12	War Office and Army Accounts Department	593,000	580,000	13,000	—
	Total Effective Services...	23,647,000	23,767,000	966,000	1,086,000
	III.—Non-Effective Services.				
13	Non-Effective Charges for Officers, etc.	1,762,000	1,743,000	19,000	—
14	Non-Effective Charges for Men, etc.	1,868,000	1,782,000	86,000	—
15	Civil Superannuation, Compensation, and Compassionate Allowances and Gratuities ...	158,000	167,000	—	9,000
	Total Non-Effective Services	3,788,000	3,692,000	105,000	9,000
	Total Effective and Non-Effective Services ...	27,435,000	27,459,000	1,071,000	1,095,000
				Net Decrease...	£24,000

R. B. HALDANE. W. G. NICHOLSON, C.G.S. H. G. MILES. Q.M.G.
LUCAS. C. W. DOUGLAS, A.G. C. F. HADDEN, M.G.O.
F. D. ACLAND.

E. W. D. WARD, Secretary.

War Office, 18th February, 1909.

Home.

Repayments by Government of India, included as Appropriations in Aid of Army Estimates; other than Stores, etc., issued on Repayment.	1909-10.	1908-9.
	£	£
To meet the Expenditure for Raising and Training Recruits for India	866,400	568,200
For Deferred Pay and Gratuities for Service on the Indian Establishment	72,300	87,000
For Non-Effective Services of the European Army serving in India	1,021,623	999,530
	1,960,323	1,654,730
Deduct—Contribution from Army Funds towards Cost of Garrison of Aden and Sea Transport	230,000	230,000
	£1,730,323	£1,424,730

Austria-Hungary.

Mountain Machine Gun Detachments.—According to recent official reports, there are in the Austro-Hungarian Army 18 mountain machine gun detachments, distributed as follows:—

Fifteen 2-gun detachments with "Common" Army (6 with the 14th Corps, 4 with the 3rd, 3 with the 15th, and 2 in Dalmatia).

Three 4-gun detachments with the Austrian *Landwehr* (Alpine Regiments: 2 with the 14th Corps, 1 with the 3rd).

In the 3rd and 14th Corps, the 10 detachments of the "Common" Army are distributed as follows:—

14th Corps.

1st Regiment of Tyrolean Chasseurs (detachment No. 1), at Insbrück;
2nd Regiment of Tyrolean Chasseurs (detachment No. 2), at Roveredo;
3rd Regiment of Tyrolean Chasseurs (detachment No. 3), at Botzen;
18th Regiment of Infantry (detachment No. 4), at Brüneck;
59th Regiment of Infantry (detachment No. 14), at Linz;
4th Regiment of Tyrolean Chasseurs (detachment No. 15), at Salzburg.

3rd Corps.

47th Regiment of Infantry (detachment No. 10), at Göritz;
17th Regiment of Infantry (detachment No. 11), at Klagenfurt;
8th Battalion of Chasseurs (detachment No. 12), at Kötschach;
5th Battalion of Chasseurs (detachment No. 13), at Tarvis.

With the exception of detachments Nos. 1, 14, and 15, all are in garrison in the zone nearest to the Italian frontier, where are also stationed the 3 *Landwehr* detachments.

It is reported that there is very shortly to be an increase in the number of these detachments. There will soon be a 4-gun detachment for each of the 11 Alpine battalions instead of one for each of the three Alpine regiments, and, in addition, the 15 detachments of the "Common" Army will be raised to 39.—*Revue Militaire des Armées Etrangères.*

Austria-Hungary.

Automobilism in the Army.—Negotiations are being carried out between the authorities and the Automobilist Associations, in order that a Hungarian Volunteer Automobile Corps may be formed. Provisional regulations have been elaborated, similar to those for the Austrian Corps, but nothing as yet has been definitely settled.

Trials carried out in 1906 were again renewed last autumn at the Imperial Manœuvres in Carinthia.

The military authorities then disposed of :—

1. Two heavy trains, each composed of a road locomotive, 5 transport wagons, and a water tank (weight approximately expedient per train, 25 tons);
2. Four benzine-automobile trains, each consisting of one motor car, and two to three transport wagons (weight approximately expedient, 6 to 8 tons per train);
3. Five benzine-wagons for heavy loads (weight approximately expedient per wagon, 2 to 5 tons);
4. Sundry accessories, notably :—

a. For each of the three automobile supply trains, a benzine motor-wagon for light weights (approximate expedient weight, 1 ton). This wagon, served for the transport of the necessary *matériel* for the automobile trains (benzine in casks, oil, grease, etc.);

b. Some eight motor-cycles, two of which were of the most recent construction (two speeds), as the means of conveyance for the heads of the supply trains, and for intelligence work;

c. A new automobile workshop, which is, properly speaking, a *mobile garage* with mechanics and all the necessary tools; a dynamo, run by the motor of the car, was also fitted, so that work could be carried out at night by electric light. In addition, a small detachment for making repairs was attached to the headquarters of the 14th Corps.

It was found that the heavy trains drawn by the road locomotives were too heavy and were, consequently, unable to pass over certain bridges.

Reorganisation of the Army Staffs and the Co-related War Schools.—By provisional decrees, dated 4th October last, the Staff Corps, School of War, the Artillery and Engineer higher courses, and the Engineer Staff, have been reorganised, and an Artillery Staff created :—

Reorganisation of the General Staff.—The powers of the Chief of the General Staff have been somewhat extended (he will now correspond direct with the Commander-in-Chief of the Navy in regard to measures relating to the co-operation of the army and fleet; and also with the *Landwehr* Ministers).

The officers of the General Staff are to be replaced in the artillery brigades and establishments by officers of the Artillery General Staff.

Austria-Hungary.

The students going through courses of instruction at the General Staff will include:—

1. Officers who have not passed through the School of War, but only through the Army Corps Schools;
2. Officers who have not completed two years' study at the School of War;
3. Officers who have left the School of War after a three years' course of study.

Those belonging to the two first categories are not eligible for admission to the General Staff Corps. After their course is finished, they will return to their regiments.

The General Staff Corps will be recruited solely from officers of the last category, who must have obtained at the School of War and during their course at the General Staff the mention "Very good." After their term of from two years and a-half to three years, they will be appointed captains in the General Staff and will only do their regimental duty as senior captains, so as to ensure their being able to effectively take command of a unit. A second term of regimental service will be put in in one of the senior grades.

Certain regimental captains, who have passed successfully the examination for a superior officer of the staff, can, under exceptional circumstances, be named commandants (majors) in the General Staff Corps.

The number of officers of the General Staff will be as follows:—

Organisation.

	Old.	*New.*	*Increase.*	*Decrease.*
Colonels	37	41	4	—
Lieut.-Colonels and Commandants	147	162	15	—
Captains	211	209	—	2
Probationers	217	209	—	8
Total	612	621	19	10

The new organisation shows, then, an increase, all the more as certain duties, performed up to the present by officers of the General Staff, will be entrusted, for the future, to officers of the Artillery Staff.

Reorganisation of the School of War.—The following are the principal changes:—

Increase of the length of the course from two years to three;

Reduction of the number of pupils from 300 to about 140.

Specialisation of the School of War as the General Staff School, by the re-establishment of the Superior Artillery and Engineer courses, which from this time on will be distinct from the School of War, as was the case before 1901 and 1905;

Candidates for admission to have at least four years' service as officer, of which three must be in one unit, and an age *maximum* of 28 years, practically, they will be between 25 and 28 years of age;

Annual examination.

At the end of the third year, inspection by the Chief of the General Staff, after which students are either nominated as staff probationers or else sent back to their regiments.

Austria-Hungary.

It is to be noted that, in the definite selection of officers for the service of the General Staff, character (military qualities, energy, activity, general worth) is taken as much into consideration as success in studies.

Reorganisation of the Superior Technical Courses.—These courses (for the engineers, artillery, mechanical engineers, and foremen) will be, in future, completely separated from the School of War.

Each of these is autonomous, with a commandant and special professors.

The organisation of the engineers and artillery courses is almost identical, and analogous to that of the School of War. No one can enter for them who is over thirty. The course of studies lasts three years. Each course is dependent on the Inspector-General of the Arm, who decides the admission to the term, and then the definitive entry into the cadre of the particular staff.

The two other courses—courses of instruction—also last three years.

To the technical courses are attached, by order, the officers who have obtained permission to follow, for a year or two, the courses of a scientific civil establishment or to frequent a technical one. They must have four years' regimental service instead of the three which has been required up to the present.

Reorganisation of the Engineering General Staff.—In this staff there has, under the new organisation, been only some modifications of detail.

As opposed to the General Staff and the Artillery Staff, which are intended to be the nursery for high command, the Engineering Staff constitutes a special body in which the officers remain until the end of their career. Consequently, they are only compelled to put in a term of regimental service as captain. The proportion of the different ranks has, however, been so regulated as to ensure advantageous promotion :—

	Organisation.			
	1894.	*1907.*	*Increase.*	*Decrease.*
Generals	3	4	1	—
Colonels	10	15	5	—
Lieut.-Colonels	15	16	1	—
Commandants	18	22	4	—
Captains	60	65	5	—
Probationers	40	32	—	8
Total	146	154	16	8

There have been three new Fortification-Construction Departments created at Buda-Pest, Zara, and Lemberg.

Creation of an Artillery Staff.—This staff had already existed up to 1895. It will be common to both the field and fortress artillery.

It differs from the Corps of Artillery-engineers, in that the latter are strictly specialised for the service of the establishments, the manufacture and keeping in repair of the *matériel*, whilst the officers of the Artillery Staff are, before everything else, combatants, the men who use the *matériel*. They will be the special auxiliaries of the commanding generals in all that concerns the *matériel*, organisation, and tactics of the artillery.

Austria-Hungary.

The Artillery Staff is under the direction of the Inspector-General of the Artillery, who enjoys in this respect the same prerogatives as the Chief of the General Staff does in regard to the officers of the General Staff.

The staff is recruited from officers who have passed through the Superior Artillery School. The principal duties to which the officers of the Artillery Staff will be assigned are :—

The Artillery Bureaux at the Ministry of War;
The Artillery Bureaux at the Technical Military Commission;
The Artillery School of Firing;
The technical courses and to certain schools;
The Departments of the fortress artillery;
Each Army Corps Headquarters (1 officer);
The staff of each artillery brigade.

—*Revue Militaire des Armées Etrangères.*

France.

The Army Manœuvres for 1909.—The Grand Army Autumn Manœuvres will this year take place in the south-east of France, and will be carried out under the direction of General Trémeau, Inspector-General of Cavalry and Member of the Superior Council of War; they are to last ten days, exclusive of the time necessary for concentrating and dispersing the troops.

The following Army Corps will take part in the manœuvres :—The 13th Corps (Clermont, General Percin) and the 14th Corps (Lyons, General Robert); the two Zouave battalions from Sathonay (Lyons); the regional Lyons brigade and the 6th Division of Cavalry. The artillery of each of these two Army Corps will be completed by two groups detached from other Corps.

Army Corps manœuvres will also be carried out by the 15th Corps (Marseilles, General Manoury) and the 17th Corps (Toulouse, General Rouvray), under the orders, respectively, of Generals Galliéni and Michel, both Members of the Superior Council of War. The artillery of these two Corps will be reinforced by two groups and, in addition, two infantry brigades and two batteries of the Colonial troops will be added, for the manœuvres, to the troops of the 15th Corps.

The other Army Corps will execute divisional manœuvres for 14 days, or brigade manœuvres for 12 days, the assembling and returning being included.

Five combined cavalry manœuvres, lasting seven full days, will be carried out by :—

1. The 3rd and 5th Divisions, under the direction of General Trémeau;
2. The 7th Division and a provisional division of three Corps brigades, under the direction of General Burnez, Member of the Superior Council of War;
3. The 1st and 4th Divisions, under the direction of General Durand, Commandant of the 4th Cavalry Division;
4. The 5th and 6th Cavalry Divisions, reinforced each by a brigade of Corps Cavalry, under the direction of General Durand de Villers, Commandant of the 8th Cavalry Division.

France.

The other Cavalry Corps brigades will carry out manœuvres lasting ten days, and will further take part in the Autumn Manœuvres with their respective Army Corps.

Some infantry units and cyclist companies will take part in the combined cavalry manœuvres.

Automobilism: Special Course for Officers. Subsidies for Heavy Weight Vehicles.—In accordance with a Ministerial circular of 22nd December, 1908, a special course for officers, lasting four weeks, will be organised each year at the artillery establishment at Vincennes.

The programme includes:—

1. Theoretical instruction on the working of automobile vehicles and the delicate points of their adjustment;
2. Practical instruction:—
   a. At the workshop (maintenance in working order, adjustment, inspection, repairs, etc.).
   b. Lessons in driving, etc.

The course will be followed by an officer of each artillery establishment employing automobiles, and, eventually, by officers of the other services, selected annually by the Minister.

Similar courses lasting three months have been in force at Vincennes since last year for men employed as drivers of motor vehicles.

According to *La France Militaire* the Minister of War in the Budget for 1910, will ask for an important credit, so as to grant premiums, as in Germany, to the owners of new vehicles which may be particularly suited for war service.

Motor cars of French construction will be declared eligible of being subsidised, which, satisfying the conditions laid down, shall take part in the competition of October-November of this year, and the satisfactory working of which will be proved during this trial.

Commercial men, manufacturers, or agents residing in France, who acquire and place on regular service for the needs of their enterprises, a new motor of one of these types, can also benefit by these premiums.

Each vehicle, for which a claim to share in the premiums is put forward, will have to come before a military examination committee, when it will be submitted to a special test.

The programme of this test, as well as the nature and amount of the premiums, and the conditions of their allocation, will be determined later.

—*Bulletin de la Presse et de la Bibliographie Militaires.*

Dirigible Balloons.—The Minister of War has recently given out specifications for a new series of dirigible balloons. These specifications are as follows:—Speed, 50 kilometres (31·05 miles) an hour to be maintained for 15 hours while carrying six passengers of a mean weight of 165 pounds each; total volume, 6,500 cubic metres (229·547½ cubic feet) as a maximum; total length, 90 metres (295·2 feet); height, 20 metres (65·6 feet); greatest diameter, 13 metres (42·64 feet). The test before acceptance must be made over a 310-mile circuit against a wind of 7 metres

France.

per second (15 miles an hour), and must be a continuous flight of 15 hours at an altitude which, for two-thirds of the time, must be greater than 1,300 metres (4·264 feet). The air-ship must pass over certain fixed points. It must be able to ascend to a height of 2,000 metres (5,560 feet) with safety. A prize of £200 will be given to the competitor submitting the best plans, and smaller prizes to other competitors.—*Scientific American.*

Germany.

The Remount Service of the German Army for 1908.—There is no great change to record in the remount operations for 1908, when compared with the previous year; it, however, may be stated that there is an advance both in the numbers and quality of the horses.

27,583 young horses were brought forward in the whole extent of the Empire; out of this number 13,520 were purchased, making a proportion of about 49 per cent. The numbers, according to the various States, were as follows:—

	Brought forward.	*Purchased.*
Prussia	23,820	10,891
Bavaria	1,954	1,418
Saxony	1,438	959
Würtemburg	366	252

Prussia.—Eastern Prussia heads the list with 12,222 young horses brought forward and 6,560 purchased, chiefly for the cavalry, but with a not unimportant number also for the artillery. Hanover comes next with 2,441 brought forward and 1,223 purchased; the Hanoverian young horses are used more especially for the heavy cavalry and field artillery.

The two Grand Duchies of Mecklenburg come third on the list with 2,241 brought forward and 912 purchased, and of these very few were bred in the Duchies.

The province of Posen stands fourth, with 1,886 brought forward and 708 purchased.

In Schleswig-Holstein, 1,379 were brought forward and 432 purchased. In the Rhine Provinces, 676 brought forward and 32 purchased. In Pomerania, 548 brought forward and 222 purchased. In Brandenburg, 466 brought forward and 162 purchased. In Oldenburg, 317 brought forward and 78 purchased; but although the province of Oldenburg is very rich in horses, it contributes, relatively speaking, few remounts, for the Oldenburg horse is a heavy draught animal, and quite unsuitable for riding; the province, however, does a considerable breeding trade. Silesia stands at the bottom of the list, with 248 brought forward and 81 purchased.

In addition to the 10,891 remounts, there were 58 young mares also purchased for breeding purposes. The mean price of all the remounts reached 1,045 marks (£52 5s.) in 1908, the lowest price being 800 marks (£40).

Bavaria.—The Remount Commission had 1,954 horses brought before them, of which 1,418 were bought (a proportion of nearly 75 per cent.). The mean price was higher than in 1907. Of the number bought, 27 per cent. were produced in the country for use principally with the artillery and a few with the cavalry; 58 per cent. were bought in East Prussia for the cavalry, and 15 per cent. in

Germany.

Holstein for the artillery. In Bavaria itself, out of 731 horses brought forward, 381, or 52 per cent., were purchased; of those purchased in East Prussia, out of 962 brought forward 833, or 87 per cent., were bought; and of the 261 brought forward in Holstein, 204, or 80 per cent., were purchased.

Saxony.—Of 1,438 horses brought forward, 959, or 66 per cent., were purchased; 236 of those brought forward were of Saxon breed, of which 62, or 26 per cent., were bought. From East Prussia, 800 out of 1,040 brought forward, or 77 per cent., were purchased, while 9 out of 20 brought forward were purchased in West Prussia, and 18 out of 32 brought forward in Hanover. Of the three-year old remounts, one-third were bought from traders and two-thirds from breeders, the mean price paid being 1,003 marks (£50 3s.), while for full-aged horses, 1,300 marks (£65) was paid.

Würtemburg.—Of the 252 remount horses purchased, 70 were from Würtemburg, 60 came from Schleswig-Holstein, 95 from West Prussia, and 27 from East Prussia. Those bought in Würtemburg came partly from the State studs and partly from private breeders, while of those bought in North Germany half were bought from breeders and the other half from traders, the mean price being 1,021 marks (£51 1s.).—*Allgemeine Armee-Correspondenz.*

Report of the Medical Department of the Army, 1904-05.—The Report on the health of the Army between the 1st of October, 1904, and the 30th of September, 1905, has recently been published. The following details are taken from this official document:—

Out of a total effective of 525,711 men (Prussian, Saxon, and Würtemburg contingents), there were during the period named 339,000 cases of treatment, either in the infirmaries or in hospital. The largest number of cases (28,929) was furnished by the Guard Corps, the lowest (10,615) by the 19th Corps. The mean number of cases was 16,580 per Army Corps.

The mean daily number of sick in the entire army was 13,665, representing a proportion of 26 per thousand.

The three principal arms furnished each the following proportion of sick, calculated per 1,000 of their strength: cavalry, 664·1 per 1,000; field artillery, 662·2 per 1,000; infantry, 613·4 per 1,000.

Compared with previous years, these statistics show a steady progressive decrease in the number of cases of sickness. In 1873-74, the number of men subjected to medical treatment was as high as 1,311·8 per 1,000, in other words, each man was more than once laid up during the year. In 1883, this proportion had decreased to 845 per 1,000, and it has now fallen to 630·8 per 1,000, which indicates a sensible improvement in the hygienic conditions of the army.

The nature itself of the different diseases depends, in the first place, on the prevailing malady, and in the second place on intemperance. Diseases of the chest, heart, and the nervous system, may be classed among those which offer the greatest resistance to the efforts made by the medical service to improve the sanitary state of the army. On the other hand, there is a decrease in all the other diseases, notably contagious diseases, including tuberculosis, a success largely due to the prophylactic measures taken. The diminution in cases of traumatic origin is to be attributed to the better surveillance during exercises.

Germany.

The number of fatal cases also show a marked diminution. In 1873-74, the number of deaths was 6·7 per 1,000 of effectives; in 1904-05, it was only 2 per 1,000. Fatal accidents have diminished by more than half, and suicides have decreased from 0·50 per 1,000 to 0·39.—*Revue Militaire des Armées Etrangères.*

Recruiting Statistics for 1907.—We give some further details in regard to the recruiting returns for 1907 :—The number of young men who reached the age for military service rose to 532,092. By adding those put back from 1906 (344,697), from 1905 (269,530), and from previous classes (43,526), the total of 1,189,845 men is obtained as the full results of the recruiting sources. The classification was made as follows :—

	Men.
Unfit for service	35,802
Exempt from service	860
Put back, Emigrants, in excess	684,193
Enrolled in the Territorial Army: Combatants (*a*)	209,564
Enrolled in the Territorial Army: Non-Combatants (*b*)	3,097
Enrolled in the Navy (*c*)	10,374
Assigned to the Recruiting Reserve: of the Army	88,078
Assigned to the Recruiting Reserve: of the Navy	1,801
Attached to the first Levy of the *Landsturm*	123,019
Entered at the military age as Volunteers in the Army (*d*)	31,438
Entered at the military age as Volunteers in the Navy (*e*)	1,619
Total	1,189,845

The number of young men who enlisted in 1907 in the Army and the Navy before reaching the age for military service, amounted to 22,462 and 2,220, respectively.

By adding these last two figures to those mentioned under *a*, *b*, *c*, *d*, and *e*, we get a total contingent of 280,774 men, enrolled in 1907, of whom 266,561 were incorporated in the Army and 14,213 in the Navy.

According to the Education report, out of the 151,900 men of the Prussian contingent, states the *Neue Militärische Blätter*, there were only 39 illiterates, that is, about 0·025 per cent.—*Bulletin de la Press et de la Bibliographie Militaires.*

NAVAL AND MILITARY CALENDAR.

FEBRUARY, 1909.

1st (M.) H.M.S. *Venerable* paid off at Chatham.

2nd (T.) H.M.S. *Implacable* commissioned at Chatham.

6th (Sat.) Launch of First-class Battleship *Delaware* at Newport News for U.S. Navy.

" " 2nd Batt. Yorkshire Regiment left Cape Town in *Soudan* for Southampton.

8th (M.) Their Majesties left London for State visit to Berlin.
9th (T.) H.M.S. *Defence* commissioned at Devonport.
10th (W.) H.M.S. *Philomel* shelled and dispersed number of Mullah's followers harassing friendly tribesmen on Somali Coast.
12th (F.) Their Majesties left Berlin for England.
15th (M.) H.M.S. *Africa* paid off at Chatham.
16th (T.) H.M.S. *Africa* recommissioned at Chatham.
17th (W.) 2nd Batt. Royal Scots left Bombay in *Dongola* for Southampton.
20th (Sat.) H.M.S. *Bellerophon* commissioned at Portsmouth.
22nd (M.) Launch of H.M.S. *Vanguard* from Messrs Vickers' Yard at Barrow-in-Furness.

FOREIGN PERIODICALS.

NAVAL.

ARGENTINE REPUBLIC.—*Boletín del Centro Naval.* Buenos Aires: November-December, 1908.—"The Altometer." "Naval Idioms." "Professional Characteristics." "Introduction to the Book, War at Sea." "Corrosion of Tubes on Board Ship."

AUSTRIA-HUNGARY.—*Mittheilungen aus dem Gebiete des Seewesens.* No. 3. Pola: March, 1909.—"The Combined Italian Naval and Military Manœuvres of 1908." "The Netherlands Naval Estimates for 1909." "The Firing at the Obsolete French Battleship *Amiral Duperré*." "What Lessons has our Medical Department Learnt from the Medical Experiences of the Russo-Japanese War." "Firing Experiments at the French Battleship *Iéna*."

BRAZIL.—*Revista Maritima Brazileira.* Rio de Janeiro: December, 1908.—"U. S. Battleships." "A Visit to Barr and Stroud" (*concluded*). "Organisation of the Staffs of the Principal Naval Powers." "The Small Navies of the Mediterranean and Black Sea."

CHILI.—*Revista de Marina.* Valparaiso: November, 1908.—"The Great Naval Powers." "Practical Instruction in Fishing." "Floating Docks." "Smokeless Powders." "Necessity for Reorganising the Medical Department." "War at Sea" (*continued*). "Firing Exercises." "Launch of the *St. Vincent*." "Prize Firing in Foreign Squadrons."

FRANCE.—*Revue Maritime.* Paris: December, 1908.—"The French Navy at the Anglo-French Exhibition at London, 1908." "History and Golden Book of the Corporation of Marseilles Pilots" (*concluded*). "The New Destroyers." "Gas Motors in H.M.S. *Rattler*." "Type of Battleship to be Adopted by the Italian Navy."

La Vie Maritime. Paris: 10th February, 1909.—"The Balance Sheet of the Navy: The *Personnel*." "The Duty of the General Staffs." "Installation of a Gunnery Range-Testing Ground at Sea." "The U.S. Armada." "Explosions at Gâvres." "German Matters."

25th February.—"The Balance Sheet of the Navy: The Navigating *Personnel*." "The Composition of the Staffs of Ships." "Let us get rid of X." "The Armoured Torpedo-boat." "The Circumnavigation of the U. S. Fleet." "German Matters."

La Marine Française. Paris: February, 1909.—"The Naval Arsenals: The Necessity for their Maintenance." "The Naval Manœuvres of 1906." "The English to the Rescue." "A Close Alliance: The Naval Feodality and Metallurgy." Everybody's Opinions:—"In the Fleet." "The Classification Commission." "The Jonquières Commission and the Organic Law on the Administration of the Navy."

Le Yacht. Paris: 6th February, 1909.—"Administrative Simplifications." "Yachting Notes." "The Works at the Port of Marseilles." "The Italian Submersible *Otaria*." "Wireless Telegraphy and Navigation." 13th February.—"The Balance Sheet of the Navy." "Yachting Notes." "*A propos* of the Launching of the *Voltaire*." "The Future Naval Programme." 20th February.—"Naval Construction Accounts." "Yachting Notes." "Interims in Commands." "The U. S. Battleships *South Carolina* and *North Dakota*." 27th February.—"Some Reflections on the Flotillas." "Yachting Notes." "The Destroyer *Chasseur*."

Le Moniteur de la Flotte. Paris: 6th February, 1909.—"The Firing at the *Iéna*." "The Credits for the Navy." "The Nominations in the Administrative *Personnel*." "The Navy in Parliament." 13th February.—"The Balance Sheet of the Navy." "The Lighting of the Coasts of Morocco." "The Interims on Board Ships of the Fleet." 20th February.—"General Inspections." "The Balance Sheet of the Navy." "The Navy in Parliament." 27th February.—"The Construction of Submarines in Private Yards." "More of the Balance Sheet." "Organisation of the Administrative *Personnel*." "The Disciplinary Council."

GERMANY.—*Marine Rundschau.* Berlin: March, 1909.—"The Jubilee of the Prussian Ministry of War." "Sea Ship and Inland Navigation." "Regulations for the Use of Wireless Telegraphy" (*concluded*). "The Present Position of Submarine Sound Signals." "New Forms of Ships' Hulls for High Speeds." "The Philippines under Spanish and American Rule." "The New Chronometer Journal and its Employment." Exchanges of Opinion:—"The Harbour Works at Swakopmund." "On the Essay:—The Present Position of Coaling at Sea." "Night Naval Action."

ITALY.—*Rivista Marittima.* Rome: December, 1908.—"A Particular Case in the Problem of Reconnaissance at Sea." "Compulsory Arbitration." "The Protection of Warships against Attack by Torpedoes and Mines." "Experiments with Non-Conducting Materials."

PORTUGAL.—*Revista Portugueza, Colonial e Maritima.* Lisbon: December, 1908.—"The Diplodocus of the Secondary Era." "The Portuguese-German Mozambique Frontier" (*continued*). "The Question of Macao." "The Colonial Movement: Africa, Asia."

Annaes do Club Militar Naval. Lisbon: January, 1909.—Has not been received.

SPAIN.—*Revista General de Marina.* Madrid: February, 1909.—"Errors in Practical Navigation." "The Contracts for the Service of the Fleet" (*continued*). "Modern Battleships."

MILITARY.

AUSTRIA-HUNGARY.—*Danzer's Armee-Zeitung.* Vienna: 4th February, 1909.—"The Experiment of the Political Spirit." "Schönaicks' End." "The Preparation for the War of 1866 and 19**." "Tributary?" "Servia's Conduct of War." "The General Staff and Ministry of War in Russia." 11th February.—"The Reconstruction of the Bienerth Cabinet." "Patriot or Traitor?" "Recently Discovered Great Austrian." "Italian Historical Mis-statements." "Financial Preparation for War and Conduct of War." "Bulgaria's Military Strength." "The Strength of the Paris Garrison." 18th February.—"A Programme of Self-Evidences." "A Preface to a New Military Law." "Past and Future of Our Balkan Policy." "Where the Russian Army is Ailing." "Out of the Turkish Army." 25th February.—"Settlement." "The War of To-morrow." "The Manin Case." "Anti-Militarism in Bohemia." "The Bank Question."

Streffleurs Militärische Zeitschrift. Vienna: February, 1909.—"The Battle of Prag on 6th May, 1757." "The War in the Present." "Impressions of the Artillery Course at Hajmáskér, 1908." "Montenegrin Conduct of War and Tactics." "Military Reforms in Italy." "The Military Strength of the Balkan States: A. The Servian Army; B. The Montenegrin Army." "Notes from the Army Firing School."

Kavalleristiche Monatshefte. Vienna: February, 1909.—"Graf Alois Paar: Obituary Notice." "Letters on the German Cavalry Instructions." "In how far will the Providing of Cavalry with Better Firearms and with Machine Gun Detachments Influence its Efficiency in a Future Campaign?" "On the Employment and Efficacy of the Cavalry Division." "The Long Rein in the Training of Remounts." "War-Ready Squadrons." "The Scouting Detachment of the 3rd Infantry Division during the Grand Manœuvres in Carinthia, 1907." "Prize Riding and Prize Jumping in Vienna and Budapest." "A Reform of our Prize Riding and Jumping Competitions." "What is the Object of Distance Rides and Drives?" "Tactical Problem for Cavalry Officers."

BELGIUM.—*Bulletin de la Presse et de la Bibliographie Militaires.* Brussels: 15th February.—Has not yet been received.

FRANCE.—*Journal des Sciences Militaires.* Paris: 1st February, 1909.—"Some Ideas on the Instruction of an Infantry Regiment" (*continued*). "Reserve Officers." "The *Rôle* of Cavalry in the Services of Scouting, Security, and Covering" (*continued*). "Promotion." "*A propos* of Compulsory Recruiting in Algeria." "Automobilism from the Military Point of View" (*continued*).

15th February.—"Reserve Officers" (*continued*). "Some Ideas on the Instruction of an Infantry Regiment" (*continued*). "Promotion" (*concluded*). "Considerations on the Russo-Japanese War" (*continued*).

Le Spectateur Militaire. Paris: 1st February, 1909.—"Some Social Characteristics of the Influence of Napoleon I." (*continued*). "The Blockade of Besançon by the Austrians (1814)" (*continued*).

15th February.—"Some Social Characteristics of the Influence of Napoleon I." (*continued*). "A New Portable Infantry Tool." "The Corps of Observation of the Alps in 1815" (*continued*). "The Blockade of Besançon by the Austrians (1814)" (*continued*).

La Revue d'Infanterie. Paris: February, 1909.—"Musketry Instruction, Practice Grounds, and Ranges." "In what Measure have the Conditions of Success in War been Modified since 1871? (by General von Blume)." "Observations on the Tactics of the Russian and Japanese Armies during the Manchurian Campaign" (*continued*). "The Realities of the Field of Battle" (*continued*). "The New Equipment of the English Infantry."

Revue de Cavalerie. Paris: January, 1909.—"Our Cavalry in the Next War (by General von Bernhardi)." "The Events of 1881-1882 in the Chott-Chergui." "Letters of a Dragoon to MM. the Members of the Army Commission" (*continued*). "Souvenirs of a Captain of Cavalry (1851-1881)." "Letters on Algeria."

Revue d'Artillerie. Paris: December, 1908.—"Reorganisation of the Artillery." "Determination of Objects Concealed from View by Means of the Captive Balloon" (*continued*).

Revue Militaire Générale. Paris: February, 1909.—Has not yet been received.

Revue d'Histoire. Paris: February, 1909.—"Montcalm at the Battle of Carillon (8th July, 1758)" (*concluded*). "The Armies of the Rhine at the beginning of the Directorate (Sambre-et-Meuse, Rhine-et-Moselle)" (*continued*). "The Battle of Messkirch (15th Floréal an VIII., 5th May, 1800)" (*continued*). "The Services at the Rear of the Grand Army in 1806-1807" (*continued*). "The Battle of Busaco (27th September, 1810)" (*concluded*). "The War of 1870-1871." "The Investment of Paris" (*continued*).

Revue Militaire des Armées Etrangères. Paris: February, 1909.—"The Russo-Japanese War" (*continued*). "The Imperial German Manœuvres in 1908." "The Austro-Italian Frontier and the Adriatic."

GERMANY.—*Artilleristiche Monatshefte.* Berlin: February, 1909.—"Modern Artillery Tactics" (*concluded*). "Mechanical Time Fuzes" (*continued*). "The Firing of the Field Artillery at Over-Great Distances in the War in East Asia." "Foot Artillery Observations." "On the Shrapnel Shell Question." "Determination of the Shape of the Heads of Projectiles." "A New Form of Prism for Telescopic Sights." "On Artillery Scouting." "Firing Shells against Batteries with Shields." "New Organisation of the French Naval Artillery."

Jahrbücher für die Deutsche Armee und Marine. Berlin: February, 1909.—"Training for War." "The Military Efforts of Prussia under Frederick the Great and those of the German Empire" (*concluded*). "The Lessons from the South African and Russo-Japanese Wars in the Employment and Best Use of Field Artillery." "The Naval War Material of the

Great Powers in January, 1910." "Custozza, 1848 and 1866." "How can Economy be effected in the Military Judicial Department in Officials, Costs and Time."

Internationale Revue über die gesamten Armeen und Flotten. Dresden: February, 1909.—"Military and Naval Intelligence from China, France, Germany, Italy, Montenegro, Austria-Hungary, Russia, Turkey, United States." *Supplement No. 104.*—"Military Glances at the Year, 1908." *French Supplement No. 119.*—"The Principal and Auxiliary Arms in the Struggle for Fortified Field Positions." "Rides in the Russian Army." "German Military Aeronautics during the War of 1870-71." "A German Landing in England." "Lessons that Cavalry can Draw from the Last War." "Glance at the Operations of the Von der Tann Detachment, 17th October-18th November, 1870." "Launch of German Battleship *Posen*."

Militär-Wochenblatt. Berlin: 2nd February, 1909.—"The Development of the French and German Q.F. Field Artillery." "The British Army:—1. The Present Strength of the Territorial Army. 2. The New Mobilisation Regulation for the Territorial Army." "New Experiments with Heavy Motor Wagons." 4th February.—"The Attack and Defence of Fortified Field Positions." "The Development of the French and German Q.F. Field Artillery" (*concluded*). "The British Army (*continued*):—3. The Strength of the Mobile Field Army." "Distinguishing Marks for Officers of the Higher Staff." 6th February.—"Maps." "The Attack and Defence of Fortified Field Positions" (*concluded*). "The British Army. 3." (*concluded*). 9th February.—"Verdy's Studies on Strategy." "The Strategic Proofs of Napoleon's Skill, 1805 (Ulm) and 1809 (Regensburg)." "Scouting and Observing." "The Organisation Report of the Italian Army Commission." 11th February.—"The Tactical Employment of Searchlights." "The Supply of Officers for the Navy, their Training and Service." "Automatic Brakes." "The Organisation Report of the Italian Army Commission" (*concluded*). 13th February.—"Military Society of Berlin." "Firing Regulation for the Foot Artillery of the 19th November, 1908." "The Tactical Employment of Searchlights" (*continued*). "Our Report Cards." 16th February.—"Use the Day." "Tactical Lessons from the Russo-Japanese War in the Light of our Latest Regulations." "The Tactical Employment of Searchlights" (*concluded*). "The Civil Commission in Sweden." 18th February.—"The Counter Attack in Battle." "From the Exercise of Troops." "Protection of Stretches of Railways by Infantry." "Something on the Observation of Battle Positions." 20th February.—"A French Criticism of the French Manœuvres of 1908." "Company Exercises." "Flying Machines." 23rd February.—"Service Jubilees in 1909." "Lieut.-Colonel von Caprivi." "Reflections on the French Military Expedition in Morocco." 27th February.—"The Centenary Jubilee of the Prussian Ministry of War." "On Field Artillery Training." "News from the Danish Army."

ITALY.—*Rivista di Artiglieria e Genio.* Rome: November, 1908.—"The Piemontese Fortress Artillery from 1850 to 1860." "Certain Modern Building Materials." "The Redhibitory Vices of Horses in Relation to our Legislation." "On Calculating Armoured Concrete Floors."

Rivista Militaire Italiana. Rome: 16th December, 1908.—"The Principal Characteristics of the Art of War." "The Lombard Division in the Campaign of 1848-49, and the Present Regiments of Infantry." "Brief Notes on the Geology of the Murgia and the Territory of Gravina in Puglia." "On the Theoretic Division of the Military Art" (*concluded*). "Examples of the Use of Internal Lines of Navigation in Military Operations" (*concluded*). "The Combined Manœuvres between the Army and Navy" (*continued*). "A Frank Word *à propos* of the Single School." "Comparative Experiments between Frontal and Oblique Fire." "Military Professional Capacity." "Brief Points on the Recruiting of Non-Commissioned Officers." "The Austro-Hungarian *Landwehr*."

SPAIN.—*Memorial de Ingeniéros del Ejército.* Madrid: January, 1909.—"Study of a Profile for Trenches." "Exercises carried out by the 7th Regiment of Engineers of the French Army."

Revista Técnica de Infantería y Caballería. Madrid: 1st February, 1909.—"A Military Historian." "Clausewitz" (*continued*). "The Battle of San Juan, 1898" (*continued*). "The Army and Diplomacy." "Report on the Musketry Course by Infantry First Lieutenants at the Central Musketry School in 1907" (*continued*). "Pay of the Army."

15th February.—"A Military Historian" (*continued*). "Retired Pay of Sergeants." "The Battle of San Juan, 1898" (*concluded*). "The Field Range-finder." "Our Military Interests in Latin America." "Report on the Musketry Course by Infantry First Lieutenants at the Central Musketry School in 1907" (*continued*).

Revista Científico-Militar y Bibliotéca Militar. Barcelona: 10th February, 1909.—"Conception of the Initiative." "Field Fortification and its Fundamental Element, Shelter Trenches" (*continued*). "The Initiative." "The Annual Substitutes in France." "New Armament of the German Cavalry."

25th February.—"Conception of Command: The Action of the British Army in the War of Independence." "Schools, Libraries, and Museums." "The Art of Command" (*concluded*).

SWITZERLAND.—*Revue Militaire Suisse.* Lausanne: February, 1909.—"Infantry and Cavalry Machine Guns." "The Reorganisation of the Cavalry." "Infantry Drill Regulation: The Company in Action." "Krupp Field Guns" (*continued*). "The Ski Course for Officers."

NOTICES OF BOOKS

A Review of the History of Infantry. By Colonel E. M. LLOYD. London: Longmans, Green & Co., 1908.

It is evident that in undertaking to write a history of the evolution of the infantry soldier of to-day from his forerunner of the early days of Regular armies, Colonel Lloyd has taken in hand a labour of love. To him the military system and the national characteristics of the ancient

Greeks stand forth as clearly as do those of the English in the Peninsula, in the Crimea, or in South Africa, or those of the Japanese Armies that fought in Manchuria.

Adequately to describe this long evolution in no greater space than is afforded by a book of 290 pages, and to combine this great compression with an unfailing brightness of style, is a remarkable feat on which the author may be cordially congratulated. Colonel Lloyd's "Review of the History of Infantry" is, indeed, a work of exceptional charm and merit, full of information of high value to the student of war, and so accurate and complete as to be a veritable store-house of things worth knowing for the benefit of all lovers of military history.

The "Review," moreover, goes far beyond the promise of its title, for not only dose it trace the development of the science of war, as illustrated by the successive changes of the training formations, and armament of infantry, but it contains studies of what may be termed the "fighting value" of every nation which has formed Regular armies, or with which our English troops have been required to measure themselves. These studies are of great value, and deserve the close attention of the readers of this JOURNAL, to whom it is all-important to study the good and bad points, not only of our own soldiers but also of French, German, Russian, or American troops, all potential allies or enemies.

The systems of armies, indeed, may change, as Colonel Lloyd points out, but national characteristics, though sometimes weakened by changed conditions of life, remain fundamentally the same. Thus we find an illustrious commander of the French Army writing to Frederick the Great that the French of 1746 were "what they were in Cæsar's time, and as he has described them, brave to excess but unstable." Have not our own national military defects, too, remained as unchanged through the ages as our military virtues?

Colonel Lloyd writes instructively on the vexed question of the relative values of individual and combined action, and shows that the merits of both may be combined in harmonious working. There is, as he urges, no reason that the highest development of the intelligence and skill of the individual should conflict with that subordination to discipline, without which final success in war is impossible.

In this connection he quotes the words of General Dragomirov :—"In order to carry out military duties we require punctuality and promptitude in the execution of orders, based upon a boundless devotion, and sustained by the active working of the intelligence." This is, indeed, the ideal towards which the training of our armies must ever strive, and which is attainable only by means of a life-long education of thought.

Drill, as Colonel Lloyd says, can make certain actions become second nature to the soldier, so that he will execute them instinctively in the excitement of action; but the soldier of to-day and of to-morrow must be more than a machine: he must learn to combine reason with the instinctive action inspired by his training, and the self-sacrifice that experience shows us that we may expect from English soldiers must be combined with the self-reliance and independence of action which can proceed only from the higher training afforded to modern armies.

Colonel Lloyd's study of the qualities that these developments of war will demand from the soldier in the ranks and from the commander of

the future, leads him, in regard to the latter, to an interesting conclusion. He holds that as the soldier must become a man and not a machine, so the general must tend to become somewhat of a machine rather than a man. This is a novel idea which deserves consideration. The commander-in-chief, says Colonel Lloyd, while, owing to improved means of communication, he has more control than of yore over his lieutenants, "can see little for himself, and is, in his turn, dependent on his staff. His plans are more and more governed by supply and transport. There is less scope for brilliant strategy and tactics, for genius and *coup d'œil*; and the quality of 'the brain of the army,' or rather its nervous system, has become more important."

We will conclude this notice of a thoughtful book with one more short extract, the author's conclusion:—"Lastly, Japan has shown, as Prussia did before her, that a nation that means to win must put forth all its strength. Railways and telegraphs have increased the size of armies by facilitating their movements, and the numbers now called for can only be had by universal training for war."

With these parting words we heartily commend Colonel Lloyd's "History of Infantry" to the attention of all persons interested in the efficiency and sufficiency of our Army.

PRINCIPAL ADDITIONS TO LIBRARY DURING FEBRUARY, 1909.

Adventures in the Rifle Brigade. By Captain Sir J. KINCAID. 8vo. 2s. 6d. London, n.d.

Officers of the British Forces in Canada during the War of 1812-15. By L. HOMFRAY IRVING. 8vo. (Presented.) Welland, 1908.

The Franco-German War, July 15 to August 18, 1870. By T. MILLER MAGUIRE. 8vo. 4s. (Presented.) (Wm. Clowes & Sons, Ltd.) London, 1909.

An Explanation of the Adjustment of Ships' Compasses. By Commander L. W. P. CHETWYND, R.N. 8vo. 2s. (Presented.) (J. D. Potter.) London, 1909.

Signals and Instructions, 1776-1794. With Addenda to Vol. XXIX. Edited by JULIAN S. CORBETT. 8vo. (Navy Records Society.) London, 1908.

Life of Admiral Sir Leopold M'Clintock. By Sir CLEMENTS MARKHAM. 8vo. 15s. (John Murray.) London, 1909.

Yün-nan—The Link between India and the Yangtze. By Major H. R. DAVIES. 8vo. 16s. (University Press.) Cambridge, 1909.

My Service Days: India, Afghanistan, Suakim '85, and China. By Major-General Sir NORMAN STEWART. 8vo. 7s. 6d. (John Onseleg, Ltd.) London, 1908.

Among the Wild Tribes of the Afghan Frontier. By Dr. T. L. PENNELL. 8vo. 16s. (Seeley & Co., Ltd.) London, 1909.

Lord Haliburton: A Memoir of his Public Services. By J. B. ATLAY. 8vo. 8s. 6d. (Smith, Elder & Co.) London, 1909.

The Manufacture of Explosives: Twenty Years' Progress. By O. GUTTMANN. 8vo. 3s. 6d. (Whittaker & Co.) London, 1909.

RECENT PUBLICATIONS OF MILITARY INTEREST.

COMPILED BY THE GENERAL STAFF, WAR OFFICE.

JANUARY, 1909. PUBLISHED QUARTERLY.

Communicated by the General Staff and reprinted by permission of the Controller of His Majesty's Stationery Office.

Continued from February JOURNAL, p. 288.

CONTENTS.

PREFATORY NOTE.

This Pamphlet will be issued quarterly, in April, July, October and January. Its purpose is to draw the attention of Officers to British and Foreign publications of Military interest which are likely to assist them in their professional work. Copies of the pamphlet will be distributed to the Headquarters of Commands, Educational Establishments, Units and Reference Libraries.

PART I.—BOOKS (*continued*).

NOTE 1. *When the price is not given in Part I., it is not known.*
2. *In Part I., books whose titles are given in foreign languages, as well as in English, are published in those languages, and are not translated.*

FORTIFICATION AND MILITARY ENGINEERING.

Engineer Field Manual. Prepared under the direction of the Chief of Engineers, U.S. Army. 456 pp., and index. Numerous plates. 8vo. Washington, D.C. 1907. U.S. Government Printing Office.

The book is divided into 6 parts, viz.: (I.) Reconnaissance; (II.) Bridges; (III.) Roads; (IV.) Railroads; (V.) Field Fortifications; and (VI.) Animal Transportation.

Though entitled a "Field Manual," the book gives considerably more detailed information than is customary in the "Field Manuals" issued to our army.

Part I., dealing with "Reconnaissance," gives very detailed information, not only about military sketching, as understood in our army, but also about survey work in general, including a description of the construction, adjustment, and use of various instruments, such as a Field Level and Theodolite.

Part II., entitled "Bridges," while giving various examples of temporary military bridges, at the same time gives much valuable information regarding stores, and formulæ for the calculation of stresses in bridges of a more permanent nature.

Part III. deals with "Roads," and is devoted more especially to the repair of existing ones, as it is pointed out that, as far as roads are concerned, this will generally be the work which the Military Engineer will have to perform. Tables are included in this part for assisting in the calculation of the amount of earthwork necessary in repairing, or constructing, a road.

Part IV. is devoted to "Railways," about which much information is given regarding rolling stock, traffic management, and the laying out of a line of railway. Very little information is, however, given regarding rapid repairs to a railway.

Part V. gives various dimensions of field entrenchments, obstacles, etc., and the definition of terms used in connection with them.

A considerable portion of this part is given up to a description of military mining.

Part VI. includes a considerable amount of veterinary information, while, at the same time, giving some interesting notes on transport, and pack-transport more especially.

AERIAL NAVIGATION.

Germany and England, plain speaking to the Emperor (Deutschland und England, ein offenes Wort an den Kaiser). By Regierungsrat R. Martin. 94 pp. 8vo. Hanover, 1908. Adolf Sponholtz Verlag. 1/6.

This enthusiast on aerial navigation for military purposes, to be devoted to offensive uses against Great Britain, has already published two or three books dealing with the same subject, which have been noticed in this publication.

The author commences, in his introduction, with an appeal to the Kaiser to place the foreign policy of Germany on a sound basis, and to abandon ship building for air-ship construction, which is, in his opinion, the only means by which Great Britain can be brought to subjection.

He devotes a chapter to the question of the daily increasing danger of a general world war, and another to pointing out how England's geographical position as an island will cease to exist once Germany has command of the air, and that consequently the difficulties which Cæsar, William the Conqueror, and Napoleon had to contend with in the invasions by the two former, and the contemplated invasion by the latter of Great Britain by sea will be eliminated from the problem.

After dealing fantastically with the manner in which an invading army of 200,000 could be landed in England by means of air-ships, he concludes his book semi-apologetically by arguing at some length that the very fact of Germany possessing the means to put this operation into practice will force Great Britain into an Anglo-Teutonic alliance, which would be entirely acceptable to Germany; for Mr. Martin maintains that the political and commercial interests of Great Britain in no way clash with those of the German Empire, and that the last thing desired in Germany is to see the dismemberment of the British Empire.

Notes on the Aeroplane Problem (*Equilibrium and Stability*) (Notes sur le problème de l'Aeroplane (Equilibre et Stabilité)). Ed. W. Bogaert, Belgian Naval Engineer. 68 pp. 8vo. Brussels, 1908. Ramlot.

This is a very technical treatise, but should be of interest to students of the theory of aeroplanes.

The Employment of the Balloon and Motor Air-ship in the Navy (Die Verwendbarkeit von Ballon und Motor-Luftschiff in der Marine). By Captain von Neumann. 39 pp., 1 plate and 5 diagrams in the text. 8vo. Berlin, 1908. Mittler. 1/-.

Captain Neumann, the author of this pamphlet, is an instructor in the German air-ship battalion and is, therefore, presumably as far advanced in knowledge of the science of aerial navigation as it is possible for anyone to be at the present time.

The first chapter is devoted to the former attitude of the Navy towards the employment of balloons, the second to general principles, the third to the present state of the science of aviation with special reference to the Navy. This last-named chapter contains a useful table, showing details of types of the three systems of air-ships, rigid, semi-rigid, and non-rigid, giving diagrams of each. The fourth chapter describes future possibilities for the air-ship, and suggests methods for its employment in the Navy.

The fifth and last chapter deals with the present progress in the science made by foreign countries.

A plate at the end of the book gives the radius of action of a motor air-ship of certain power against given strengths of wind.

MEDICAL.

American National Red Cross Textbook on First Aid and Relief Columns. By Major C. Lynch, U.S.A. 247 pp., with 74 illustrations. 12mo. Philadelphia, 1908. Blakiston. 4/2.

This is a small pocket volume on first aid, prepared for the American National Red Cross. It contains a preface by the Surgeon-General of the United States Army, and is one of the outcomes of the recent re-organisation of Red Cross Societies in the United States, by which they have become affiliated to the medical department of the army, and organise work for war under its control. The contents are the usual contents of books on first aid for the instruction of persons, who are not members of the medical profession, in methods of preventing accidents and treating injuries in case of emergency. It also contains a chapter on transport of sick and wounded, and on the organisation of classes of instruction and relief columns. There is also a chapter on so-called First Aid Contests. The organisation of relief columns is perhaps the most interesting and novel feature in this little book.

Instruction of Medical Officers in Tactics (Taktische Ausbildung der Sanitätsoffiziere). By Generalleutnant v. Oven. 3rd revised edition. 117 pp., with diagram in the text and two maps. 8vo. Berlin, 1908. Eisenschmidt. 3/6.

In the preface to this volume the author points out the reasons why medical officers should be instructed in tactics, and remarks that it is only recently that military officers have realised the necessity of this. In an introductory chapter he states very clearly the reasons why it is important that medical officers should, equally with all other officers, have a thorough knowledge of the organisation of an army, and the method by which it is handled in the field, especially as it rests with them to employ the medical resources in the manner that is most adapted to the military situation at the time, and which will interfere to the least extent possible with the operations of other branches of the service. Without this knowledge the medical officer is apt to be far away from the spot where he is needed, or the medical equipment and transport to be wanting even if he himself is on the spot.

The courses of instruction presented by General v. Oven consist of a short preparatory course in the general principles of tactics, with instruction in the method of writing messages and other orders in the field. Several pages are devoted to information regarding the reading of maps and the making of field sketches. The importance of the latter is emphasised by several examples in which the necessity of medical officers being able to make rapid sketches showing the positions of aid-posts and other medical units, as well as the direction of evacuation, is graphically illustrated.

This is followed by a chapter explaining the method of forming columns on the line of march, taking up quarters for billeting, etc., together with examples. A special chapter is devoted to baggage columns, ammunition columns, and other transport columns, to the length of columns on the march, and to the timing of marches. There is also a chapter on the issue of orders, with examples.

The remaining half of the volume contains a series of exercises and instruction in war games and staff rides, with special reference to the tactical operations of the medical service. The details of these, and the examples given of complete rides, are very fully described.

Notes from the Diary of a Medical Officer (Aus dem Tagebuch eines Arztes). By Oberarzt Dr. H. von Ortenberg (retired). 2nd edition. 120 pp., with 22 illustrations. 8vo. Berlin, 1908. Schwetsche. 3/-.

The first edition of this volume was published in 1907, and is republished now as a second edition without alterations. It contains notes of the German Expedition to South-West Africa. The author sailed for South-West Africa in May, 1904. The ship took natives on board at Liberia and other West Coast possessions to work as labourers at Swakopmund, on pay of one shilling a day with rations, and there are other interesting notes of events during the voyage, such as inoculation against enteric fever of all the medical officers as an example to others. The General Officer commanding would not, however, let the men be inoculated, as he did not want them to arrive sick. The author was at first on duty at the base hospital at Swakopmund, and subsequently at the stationary hospital at Karibib. He was eventually appointed medical officer of No. 4 Company of the 2nd Field Hospital, being invalided home after a year's service with it, at the end of 1905. The diary is a daily record of his experiences and impressions, and contains, amongst more general descriptions and criticisms, interesting notes on enteric fever, dysentery, and scurvy, which seem to have been specially prevalent amongst the troops.

ORGANIZATION AND ADMINISTRATION.

Principles of German Army Administration (Grundzüge der Deutschen Militärverwaltung). By Dr. L. Meyer (Head of a Section in the Prussian War Office). 446 pp. 4to. Berlin, 1908. Mittler. 8/6.

This book is a useful guide to the study of the mechanism of the military machine in Germany. The position of the author as head of a section (*Abteilungschef*) in the Prussian War Ministry gives the information a semi-official stamp. The book commences with a history of army organisation in Prussia from the 14th century onwards, ending with a short summary of the organisation of the German Army at the present date. The next chapter, which is the longest, is divided into four sections, viz.:—Section I. *General Principles.* Under this heading the relations of the Emperor, the Bundesrat, and the Reichstag with reference to constitutional and military questions are explained. The object of army administration is defined as "to organise the armed forces and maintain their organisation in such a way as to enable them to assist in carrying out the policy of the State, both in peace and in war." The author goes on to argue that the service of administration must always be subordinate to that of command, but that the supreme direction of both services must be combined in the person of the Emperor. Section II. gives the distribution of duties among the various departments of the State; Section III. the distribution of duties in the Prussian War Department, the General Staff, the Army Inspections, the Remount and Medical Departments, and the War Offices of Bavaria, Württemberg, and Saxony. Section IV. deals briefly with the organisation of administrative duties in war, especially as regards the supply of the army. Distinctions are drawn in some cases between these duties in connection with field troops, garrisons, and reinforcements.

The next thirteen chapters deal with the several administrative departments of the army, explaining in each case the general organisation of the department, the responsibilities of the different authorities concerned, and the mechanism by which measures are initiated, decided upon, and carried into effect. In some cases, but not in all, the working of the administrative services on mobilisation and in war time is briefly explained.

BOOKS OF REFERENCE.

Firck's Pocket Calendar for the German Army (Firck's Taschenkalender für das Heer). 32nd edition. By General von Gall. 548 pp. 12mo. Berlin, 1909. 4/-.

The above is the 1909 edition of this useful pocket-book, which appears annually on the 1st October.

The book is in 2 parts. Part I. contains information of a personal nature, *e.g.*, genealogies of the Royal Families of Germany; position of military men in relation to their duties and liabilities as citizens.

Part II. contains information about the German Army system and organisation under 15 headings, special sections being devoted to supply of horses, duties in garrison, clothing and equipment, supply, accommodation in quarters or in the field, and distribution of the army in peace. Those items which contain fresh information since last year's edition are marked with red asterisks in the index.

The Army Annual Year Book and Almanack, 1908. Edited by Major F. S. Baden-Powell. 467 pp. 4to. London, 1908. The Army Press. 7/6.

The first edition of this publication. It contains full information on the various methods of obtaining commissions in the Regular and Indian Army, Special Reserve, and Territorial Force, together with a full account of the new Territorial scheme from its origin.

Articles giving a brief account of Manœuvres and Campaigns of the year, and the lessons to be learnt from them; the policy on the North West Frontier; recent progress in Aerial Navigation; and Machine-guns, are included.

In addition it contains details regarding an Army in the Field, the Indian Army, the year's Recruiting, and the Army Estimates, and concludes with a brief account of the Military career of the late Sir Redvers Buller, and of the Union Jack Club.

More than a quarter of the book consists of extracts from Regulations on Pay and Pensions, and Lists of Officers holding Staff Appointments at home and abroad.

The Establishments given are not quite up to date, but otherwise as a book of reference on the Military Service it should prove of value.

The Mexican Year Book, 1908. Compiled from official and other records. 978 pp. and index, 16 plates and 23 maps. 8vo. London, 1908. McCorquodale. 21/-.

The rapid progress of Mexico has necessitated the appearance of this bulky volume, the first issue of what is to be an annual publication. It contains a mass of useful information, and is at present without a rival as a book of general reference.

A Short Guide to the Various Ways of Obtaining a Commission in His Majesty's Regular Army. Official. 49 pp. 8vo. London, 1908. Harrison. -/2.

This pamphlet gives an outline of the various methods of obtaining commissions in each branch of the Regular Army, Special Reserve of Officers, and Territorial Force.

It states briefly age and other qualifications, examinations and other tests, and contains information where and how detailed and official information can be obtained by parent or guardian.

In conclusion it gives a few notes for the guidance of candidates, who have fully qualified for commissions, as to choice of regiments, method of gazetting, outfit, &c.

TRAVEL AND TOPOGRAPHICAL.

Twenty Years on the North-West Frontier. By G. B. Scott (Survey of India). 272 pp., with two maps. Crown 8vo. Allahabad, 1906. Pioneer Press. 2/4.

An interesting record of a surveyor's experiences among the Pathan tribes of the north-west frontier of India, beginning in the early sixties and ending with the Afghan War of 1878-80. The writer tells the story of the Ambela Campaign of 1863, and relates personal experiences in the Black Mountain Expedition of 1868 and the Afghan War. The account of the two Bazar Valley Expeditions in 1879, and the chapter "Among the Mohmands" are of special interest in the light of recent events.

The book concludes with a chapter entitled "Can Russia invade India," in which the writer criticises our past dealings with Afghanistan, and gives his views as to the steps to be taken to secure India against the Russian menace.

Travels in the Indies (*Indische Reisherinneringen*). By H. Weede. 521 pp., with 207 photos in the text, and a sketch map of part of Bali. 8vo. Haarlem, 1908. Willink. 8/9.

This is an account of the author's travels through the islands of the Dutch Archipelago, with descriptions of the places visited, the resources of the country, and the manner and customs of the natives. The book also contains accounts of some military expeditions which the author accompanied.

The first volume deals chiefly with Java; it contains also a short account of New Guinea, and a description of an expedition which resulted in the capture of a mountain fastness in Celebes.

The second volume describes the ascent of the lofty volcano of Smeru in Java, and gives an account of the island of Bali, together with a description of the 1906 Bali expedition.

In the Moluccas. A Tour in a Vessel of the Koninklijke-Paketvaart-Maatschappij (In de Molukken. Reis met de Booten der Koninklijke-Paketvaart-Maatschappij). By Dr. Gronemann. 79 pp., with numerous photographs. Amsterdam, 1905. Von Holkema & Warendorf. 1/7.

This is a narrative of a tour undertaken by the author in the Dutch East Indies, with descriptions of the scenery, illustrated by photographs of the places visited. These include Bali, Lombok, Makassar, Banda, Ambon, Bachan, Ternate, and Borneo.

The Island of Ceram and its Inhabitants (Het Eiland Seran en zijne Bewoners). By F. Sachse, Captain of the Dutch East Indian Army. 184 pp., with 1 map and 1 plate showing sections. Leiden, 1907. E. Brill.

The Island of Ceram is the largest of the Moluccs group in the Netherlands East Indies. The book contains a full description of the island, with separate chapters devoted to the resources, industries, manners, and customs of the inhabitants. The latter are "head-hunters," and though the author states that it is no longer essential for a man to have secured an enemy's head before he may marry, he adds that those who can produce a few such trophies are naturally more popular with the women. The heads are not, however, the property of the fortunate warrior, but of the community. It is strictly forbidden to enquire who secured any particular head.

The book contains an index, a map of the island, and some sections. It is useful as a book of reference.

MISCELLANEOUS.

Marshal Alexander Berthier and his End (Marschall Alexander Berthier und sein Ende). By Dr. phil. Michael Strich. 127 pp. 8vo. Munich, 1908. Reusch. 3/-.

Michael Strich has written this book partly with a view to supplementing Derrécagaix's recently published biography of Marshal Berthier, which he feels to be incomplete in one respect. The strategical services and military virtues of the great Chief of the Staff have been dealt with by Derrécagaix, Michael Strich maintains, with very commendable thoroughness, but the man Berthier has been passed over too briefly. This is particularly regrettable, he continues, as a psychological study of the Marshal affords an indispensable clue to the solution of the problem of his death.

Michael Strich gives a short narrative of the life of Alexander Berthier, combined with an exceedingly interesting character study of this remarkable man, who was Napolean's constant and most trusted companion.

The final catastrophe, which was enacted at Bamberg on 1st June, 1815, is examined with minute care, the author having had access to the archives of Bamberg, Munich, Vienna, and Berlin. One is led irresistibly to the conclusion that Berthier caused his own death, and that it was not the result of an accident, or the work of assassins, as has been averred. If further confirmation of this conclusion were needed, the psychological history of the great Chief of Staff, as narrated in this volume, would provide it abundantly.

The Military Report on Acheen (Verslag betreffende het gehouden onderzoek naar het militair beleid in Atjeh en Onderhoorigheden). 93 pp. 4to. Published officially. 1908.

This report, which is published officially in Holland, was called for as the result of allegations which had been made in the press, and in an anonymous brochure entitled "Wekker" (Awakener), of atrocities having been committed by the troops of the Dutch East Indian Army.

The report commences with a short account of the methods of warfare employed in the colony.

The enemy consist of "bands" who practise guerilla warfare, retiring, when pressed, to hiding places in the mountains.

To meet these tactics of the enemy the Dutch troops are organised in patrols, who keep the enemy constantly on the move and track them down in their own haunts. The best troops for this work are the Amboinese and natives of Timor.

The charges brought against the troops are reduced to 6 headings, viz.:—

(*a*) Forcible requisitioning of supplies. (*b*) Firing on villages without summoning them to surrender. (*c*) Shooting women and children. (*d*) Putting to death of guides spies, prisoners, and unarmed men. (*e*) Ill-treatment of the inhabitants, and torturing natives to compel them to give information. (*f*) Mutilation of dead bodies.

The results of the investigation may be summed up as follows:—

As regards (*a*)—The system of operating with small "patrols" makes it necessary to live on the country. Compulsory requisitioning is therefore authorised, but in a regular manner and on payment.

As regards (*b*)—Owing to the habits of the enemy, who take flight if alarmed, the advantage of surprise would often be lost if a word were spoken before fire is opened.

As regards (*c*)—Women and children are difficult to distinguish by their dress, and often take part in the fighting with the men.

As regards (*d*)—No native is ever compelled to serve as a guide against his will. It is therefore considered legitimate to execute guides who are guilty of treachery.

As regards (*e*)—Ill-treatment of natives was specially forbidden by an order of the Commandant in 1903.

As regards (*f*)—No evidence was forthcoming as to the alleged mutilation of dead bodies.

The following documents are amongst those attached as appendices to the report:—

Appendix I., II. General Instructions for the Commandants of columns and patrols, 1903 and 1905.

Appendix III. Distribution and strength of the troops in Acheen in 1904, 5, 6.

Is Germany superior to us? Impressions from beyond the Vosges (Ist Deutschland uns überlegen? Eindrücke jenseits der Vogesen). By Major Driant (translated into German by Lt. Hedler). 32 pp. 8vo. Berlin, 1908. Walther. -/6.

This work is a translation from the French. The author, Major Driant, a son-in-law of General Boulanger, has already given vent to a cry of alarm, when he published in 1906 a pamphlet entitled "vers un nouveau Sedan," which caused a considerable sensation at the time. He now again calls the attention of his countrymen to what he considers the superiority of the German Army, German character, and German institutions.

His opinions of the German Army were apparently chiefly derived from attendance at some Imperial manœuvres in Silesia. He quotes from conversations with German officers, who appear to think that they will some day go to war with France, but would much prefer to fight the English. The latter, however, they say have unfortunately no army. But they (the English) must have troops on the continent, and the French have been selected for this purpose. The German officers warned the Frenchman that his country would get no help from England. England, they said, is the only country in Europe that does not fear war, as she has in the past always got other nations to do her fighting for her.

Major Driant's admiration of Germany and all things German is almost fanatical. Particularly does he contrast the slackness of discipline, the "Hervéism," and anti-militarism, which he asserts are rife in the French army, with the order and strict discipline that obtain in the armed forces of the German Empire.

A New Wörth (Ein neues Wörth). By Major von Hoppenstedt. 238 pp., with 2 maps and 9 plans in the text. 8vo. Berlin, 1909. Mittler. 5/-.

The author of this book has already penned another on the same lines, entitled "The Battle of the Future," which has attracted some attention in Germany, and was noticed in No. 1 of this publication.

"A New Wörth" is a graphic and spirited description of an imaginary battle fought under modern conditions on the original battlefield.

The element of reconnaissance by means of air-ships and the use of explosives from these aerostats are new factors which are introduced.

An interesting book.

After the Storm—Reflections on the Decline of the British Empire (Nach dem Sturm—Reflexionen über den Untergang des Britischen Weltreiches). Anonymous. 16 pp. 8vo. Berlin, 1908. Hermann Walther. -/10.

The pamphlet represents a fictitious lecture attributed to Arabi Pasha, and delivered at the University of Alexandria in 1911.

The subject matter is the downfall of the British Empire, which is brought about by a defeat of the British Navy in the North Sea by the German High Sea Fleet. Invasion ensues, not only of Great Britain, but also of France, by the German Land Forces. Japan seizes Hong Kong, India breaks out in revolt and falls a victim to Russia, and the United States claim Canada. The British possessions in South Africa and Ireland become Republics.

The story is represented graphically by two highly coloured maps on the cover of the book, showing the partition of the world as it exists to-day and as it will exist in 1910. The last picture shows only the entente—England, Scotland, Wales and France—painted red.

The Extinction in Perpetuity of Armaments and War. By A. W. Alderson. 213 pp. 8vo. London, 1908. King. 7/6.

The object of this book is to prove that "the causes of war are not in human nature at all." The author then goes on to consider (i) What is the cause of war? (ii) Is this cause removable?

The cause of war he attributes solely to the difference of languages spoken by nations.

In refutation of this statement the American War of Independence will naturally occur to everyone. This war the writer accounts for by saying that neither England or America realised that language, not flag or name, unites a community, and that had this fact been recognised, war between the two would have been impossible in their own interests, which were identical, as an English-speaking race. He maintains that England and the United States are as united to-day as ever they were, or as ever it is possible for two countries to be. The author's remedy for war is the adoption of a universal language throughout the world. He does not favour the foundation of a new language such as Esperanto, but the extinction of all languages except a selected one of the most widely-spread existing tongues. He states that he holds no brief for English, but that this language should be the one adopted as being most widely known, and as possessing the fewest difficulties with the greatest advantages.

The Book of War, the Military Classic of the Far East. Translated from the Chinese by Captain E. F. Calthrop, R.F.A. 120 pp. 12mo. London, 1908. Murray. 2/6.

As stated in a preface by the translator, this work still remains the most celebrated treatise on war in the literature of China. It is a collection of the sayings of Sun and Wu, two commanders who flourished about the 5th century B.C., and it is interesting to note how amongst these sayings are to be recognised many of the principles which at the present time are regarded as essential to success in war. *Moral* was even in those days recognised as of supreme importance; a commander is advised, as regards the passage of a river: "After crossing waters, pass on immediately to a distance." The health of the troops must be considered. As regards reconnaissance: "The rising of birds shows an ambush. Startled beasts show that the enemy is stealthily approaching from several sides. High, straight spurts of dust betoken that chariots are coming. Long, low waves of dust show the coming of infantry." A great deal of stress is laid upon the necessity, before giving battle, of an accurate knowledge of the enemy's condition, and for this purpose the use of spies is strongly advocated.

The book is one which will well repay perusal, although much of it is in the usual inconsequent Chinese style, of which the following is an example: "Righteousness is overcome by propriety; might by humanity; revenge by words; tyranny by deception; unrighteousness by strategy."

Horses, Horsemen, and Stable Management. By J. Bovile. 276 pp. 8vo. London, 1908. Routledge. 5/-.

The author has in this volume attempted to concentrate the experiences of authors on the above subjects from the earliest times up to the present day. He declares that the cleverest writers on horses were those who wrote from 380 B.C. up to a few centuries after Christ. In addition to the opinions of these writers, he quotes those of well-known authorities of the present day, and the result is an interesting book covering a very wide field, but not entering sufficiently into detail to be of great practical utility to horse-owners.

The Question of the Supply of Army Horses in Italy (La questione ippica militare dell' Italia). By Gaetano Benzoni. 67 pp. 8vo. Rome, 1908. Casa Editrice Italiana. 1/9.

The aim of this booklet is to call attention to the inadequate means taken to ensure the supply of army horses in Italy. The writer compares the systems in vogue in Austria, and in other European countries with that of Italy, much to the detriment of his own country. After putting forward suggestions for improving the breed of horses required for military service, and for increasing the available supply, he appeals to the Italian nation to pay closer attention to this vital question of army remounts.

Long-distance Rides (Dauerritte). By Veterinary Surgeon Dr. Heuss. 52 pp. 8vo. Berlin, 1908. Mittler. 1/6.

The author enters very fully into the question of these exercises. He treats the subject under two main headings: preparation for the ride, and the method of carrying out the ride itself.

Under the first of these headings the selection of the class of horse to employ, the conditioning and training of the animal, and shoeing, are carefully gone into. Opinion, in Germany at any rate, seems to favour half-bred horses for the purpose.

The execution of the ride includes division of the distance and the nature of pace, feeding and watering, etc.

The natures of disease resultant on long-distance riding, and the measures to be taken with reference to treatment of the horse on completion of such an exercise, are also dealt with.

The Real Japan. By Sir Henry Norman, M.P. 360 pp. 12mo. Illustrated. London, 1908. Fisher Unwin. 5/-.

This work is a fresh edition of an account of a visit to Japan in 1889, the first edition having been published in 1891, and although some attempt has been made to bring the naval and military information up to date, it cannot be regarded as otherwise than wanting in accuracy, and consequently misleading in this respect.

PART II.

MAGAZINE ARTICLES.

(For abbreviations, *see* page 431.)

AERIAL NAVIGATION.

The Future of Air-ships in War. By Major H. Bannerman Phillips. U.S.M., September.

The Problem of Flight. E., 11th, 18th, 23rd September, 2nd, 23rd, 30th October, 6th November.

Some Remarks on the Importance of Aerial Navigation for Purposes of War and Communications, Discussed in Connection with the Events of the 4th and 5th August. D.M.Z., 5th September.

The Laws of Flight. By F. W. Lanchester. E., 23rd September.

The Motor Air-ship as an Instrument of War. By Commodore Max Kuhne. J.D.A.M., October.

Dirigible Air-ships in Germany. I.R. Suppl. 107, p. 69.

The Problem of Aerial Navigation. By Major B. Baden-Powell. N.C., November.

Air-ships and Their Value in War. By Col. F. N. Maude. C.R., November.

The Possibility of Making Use of Balloons and Motor Air-ships in the Navy. Translated from an article by Capt. Neumann. First article of a series. J.U.S.I., November.

Dirigible Balloons. Their Employment on the Offensive, and the Methods of Firing at them. By Lieut. Archen. (Concluded.) J.S.M., 15th September.

The Present State of Aeronautics. (Concluded.) B.P.B.M., 15th September.

Military Aeronautics in Germany. By French General Staff. (To be continued.) R.M.E., October.

Our Military Balloon Work in 1870-71. By Miles Ferrarius. M.W.B., 3rd November.

ARTILLERY.

The Theoretical Effect of Shrapnel Fire from Q.F. Guns. By Lieut. E. M. Mansel Pleydell. P.R.A.I., September.

The 12-inch versus the 14-inch Gun (technical). By Major Hawthorne and Capt. Hamilton. U.S.A., July-August.

Notes on Interior Ballistics (technical). By Col. Ingalls. U.S.A., July-August.

A Material Target for Coast Artillery. By Lieut. Halsey Dunwoody. U.S.A., July-August.

The Need for Howitzers in the Field Army. By Major K. K. Knapp. P.R.A.I., October.

Suggestions for a Battery Commander's Cart. By Major G. R. F. Talbot. P.R.A.I., October.

The Field Gun Armament of European Nations. E., 23rd October.

Gun versus Howitzer in the Heavy Artillery of the Field Army. By Col. F. G. Stone. P.U.S.I., October.

The Effect of Shrapnel Bullets. By Lieut.-Gen. Rohne. A.M.B., September.

Remarks on Fortress Artillery. A.M.B., September.

Ballistics. By Major P. Charbonnier. R.d'A., August.

The Tactics of Field Artillery in Accordance with the Regulations for the German Artillery. By Lieut.-Gen. H. Rohne. (Continued.) B.P.B.M., 15th October.

Heavy Mortar Fire. O.M.Z., September.

The Dutch Field Gun. M.A.G., September.

The Scope of Battery Director M.5. (Baumann's Battery Director.) M.A.G., September.

Suggestions as to the Organization and Employment of Heavy Mortar Units. By Capt. Josef Berger. O.M.Z., November.

New Fuzes. By Capt. Alfred von Rüling. M.A.G., October, November.

Observation Parties in the Artillery. By D.M.C. (Conclusion.) L.B.M., 8th November.

The Increase of the French Artillery. By M. D. R.C., October.

The Question of the Supply and Expenditure of Ammunition of Modern Field Artillery. A.M.B., October.

The Fight against Shielded Batteries. K.T.Z., Heft 9.

Artillery Fire against Shielded Guns. By Capt. J. Docquin. R.d'A., September.

A Reply to the Criticisms of a "Former Battery Commander." By Lieut.-Col. Deport. L.S.M., 15th November.

The Newest Krupp Field Guns. By Lieut.-Gen. H. Rohne. A.M.B., November.

Our New Field Gun. By Major-Gen. Z. D. Richter. A.M.B., November.

Guns for Use against Dirigible Air-ships. By Lieut.-Gen. H. Rohne. A.M.B., November.

The Optical Industry in the Service of the Artillery. A.M.B., November.

CAVALRY.

The importance of Fighting Dismounted for Cavalry, and the place to be Assigned to it in Action and Instruction. By Major Immanuel. J.U.S.I., September.

Peculiarities of the French Cavalry Tactics. M.W.B., ii., No. 110, p. 2579.

The Exercises on Salisbury Plain. By a Spectator. C.J., October.

Improvised Methods of Crossing Rivers by Cavalry. By the Officers, 3rd Field Troop, R.E. C.J., October.

Cavalry Reconnaissance in all its various Forms. Editorial. R.C., August, September.

The Cavalry Leader as Horseman. K.M., September.

New Experiences and Considerations regarding the Strength and Composition of the Cavalry Divisions. K.M., September.

Mischtshenko's Cavalry Detachment in the days of Sandepu. K.M., September.

Another Method of Crossing Rivers. K.M., September.

The French Cavalry of Two Years' Service. K.M., September.

The Training of Cavalry Brigades, Divisions, and Corps. One map and 12 diagrams. By "l'Irrégulier." (Continued.) R.C., September.

The Horses of the French Army during the Revolution and the Empire. By C. A. Bidault. R.C., September.

The Manœuvres of the 2nd Cavalry Division (Belgian) in 1908. L.B.M., 25th October.

Cavalry Divisions in the German Imperial Manœuvres, 1908. K.M., October.

Cavalry in the Grand Manœuvres in Western Hungary, 1908. K.M., October.

Our Cavalry Bridging Trains. K.M., October.

Pistol Shooting from Horseback, and Experiments in the Danish Cavalry. K.M., October.

The Charge of the Cuirassiers from Morsbronn. (Wörth, 6th August, 1870.) By Major Immanuel. K.M., November.

Large Bodies of Cavalry in Action. By Major-Gen. Markus von Czerlien. K.M., November.

The Cause and Effect of Shock Tactics. By Lieut.-Col. Wenninger. (To be continued.) K.M., November.

Notes on the Development of the question of Carbines and their Importance for Cavalry. V.T.H., 1908, iv., p. 606.

Cavalry in Warfare. By Col. C. A. P. Hatfield, U.S. Cavalry. J.M.S.I., November-December.

A Visit to the Thuringian Hussars. With a diagram and twelve photographs. By Major D. Faure (French Artillery). R.C., October.

The Watering of Horses. By L. Magnin, French veterinary officer. (Conclusion.) R.C., October.

The *rôle* of Cavalry in Future Wars. Conclusions drawn from the recent Army Manœuvres in the centre of France (September, 1908). By a Cavalry Colonel. (To be continued.) J.S.M., 15th November.

DEFENCE: HOME AND IMPERIAL.

Defence of Harbours by Fortification. By Brig.-General R. F. Johnson. J.U.S.I., September-October.

Social Reform and National Military Training. By A. G. Rickards. N.R., October.

First Principles. By Sir G. Taubman Goldie. N.D., November.

The Land Fronts of our Naval Bases. By Hilaire Belloc. N.D., November.

The Territorial Army from an Employer's Point of View. By the Lord Mayor of London. N.D., November.

Coast Defence. By Major W. G. Haan. U.S.A., September-October.

Coast Defence and Home Defence. By Brig.-Col. F. R. Reynolds, late R.E. R.E.J., November.

The Development of the German Army. By Commandant Davin. Q.D., 16th October.

The Military Crisis: The Hopelessness of a Voluntary System for an Army. Belgian General Staff. (To be continued.) L.B.M., 8th November.

The Invasion of England through English Eyes. M.R., November.

Employers of Labour and the Territorial Army. By Sir John Barker. N.D., December.

FORTIFICATION AND MILITARY ENGINEERING.

Field Engineering in von Löbell's Annual for 1907. R.E.J., September.

The French and Italian Bridging Trains. Transcript. By M. R.E.J., November.

The Masking of Field Defences. Translated by Major F. G. Skey. R.E.J., December.

Military Buildings Erected by Foreign Powers in China (1900-1907). By Captain Sabatier. (Concluded.) R. du G., September.

Well Sinking in Senegal. By Captain Friry (French Engineers). R. du G., September.

The New Field Fortification Regulations of the Austro-Hungarian Army. O.M.Z., October.

Experiments in the use of Motor Ploughs for Excavating Trenches. M.W.B., No. 118, p. 2783.

Port Arthur and its influence on Fortress Construction. M.W.B., 5th November.

Experiments to Determine the Strength of the Austro-Hungarian Bridging Equipment. By Lieut. Valerian Maryánski. M.A.G., November.

Field Fortifications in the Russo-Japanese War. By Major von Toepfer. Heft 10. K.T.Z.

HISTORICAL.

Notes on the Bazar Valley Expedition (Feb. 1908). By Major C. de Sausmarez. P.R.A.I., September.

The Russo-Japanese War. By the French General Staff. (A continuation of previous articles.) R.M.E., August, October.

Napoleon's Marshals. Lefebvre, Marmont. By Captain H. M. Davson. P.R.A.I., October, December.

Review of Chapter III., Series "C," of the Dickson M.SS. By Professor Oman. P.R.A.I., October.

Famous Leaders of Cavalry. Oliver Cromwell. By Colonel H. de B. de Lisle. C.J., October.

The Russo-Japanese War. By Colonel Birkbeck. (To be continued.) C. J., October.

Oliver Cromwell's Army. By George Hutchinson. N.D., November.

The Battle of Lutzen. By Lieut.-Col. Hon. E. Noel. P.U.S.I., October.

The Diary of Colonel G. Massey. Collected by Captain C. Murphy. P.U.S.I., October.

A Study of the Campaign of 1859 in Italy. By Gen. F. Silvestre. R.M.G., September, October, November.

The Campaign of 1809 in Styria. By Lieut. Löy. (Continued.) J.S.M., 15th September.

Two Sieges from Chinese Military History. By Capt. Bleyhoeffer. (To be concluded.) M.W.B., 19th September.

The War of 1870-71. The Investment of Paris. By French General Staff. (Continued.) R.H., September, October, November.

Reminiscences of a Captain of Cavalry (1851-1881). Two photographs. By Henri Choppin. (Continued.) R.C., September, October.

Japan's Strength in War. By Gen. Kuropatkin. M.C., September-October.

Candia, and its First International Occupation. By Capt. Aymini Camillo. R.M.I., 16th October.

Politics or Strategy. A Critical Study of Austria's Campaign of Warsaw and the Attitude of Russia in 1809. By Capt. Dr. Gustav Just. O.M.Z., November, December.

Field-Marshal Baron Nodzu. By Lieut.-Col. Bronsart von Schellendorf. M.W.B., 31st October.

The Combats of the German Troops in South-West Africa. V.T.H., 1908, iv., p. 666.

1813. By Lieut.-Gen. v. Schlieffen. V.T.H., 1908, iv., p. 531.

The Events of the First Battle of Plevna. By Capt. Rücker. M.W.B., Beiheft 10.

La Moricière and the Capture of Bougie (Algeria). French General Staff. R.H., November.

The Observation Corps of the Alps in 1815. By Capt. Hennequin. (To be continued.) L.S.M., 15th November.

The Capitulation of Baylen. By Paul Metzger. (To be continued.) L.S.M., 15th November.

The Mohmand Expedition. By Lieut. A. H. Burn. U.S.M., December.

The Position of the Russian and Austrian Armies at the Expiration of the Armistice on 27th July. (To be concluded.) M.W.B., 17th November.

Recently Discovered Letters of Scharnhorst's. By Lieut.-Gen. v. Tansom. M.W.B., 8th December.

MEDICAL AND SANITARY.

Sick Nursing in the Territorial Army. By Elizabeth S. Haldane. C.R., September.

An Introduction to Methods of Studying the Morbid Histology of Disease-Carrying Insects. By Capt. A. E. Hammerton. J.R.A.M., September.

Staff Tours. By Major F. J. Wade Brown. J.R.A.M., September.

The Value of Koch's Treatment of Malaria. By Capt. N. E. Harding. J.R.A.M., September.

Some Practical Points in the Prevention of Disease in Panama and Cuba. By Lieut.-Col. W. G. Macpherson. J.R.A.M., September.

On some Functions of the Projectile from a Surgical Aspect. By Fleet-Surg. C. Marsh Beadnell. J.U.S.I., September-October.

Third Report on Experiments in Connection with Anti-Typhoid Vaccine. By Lieut.-Col. W. B. Leishman, Major W. S. Harrison, Major H. W. Grattan, Capt. A. L. Webb, and Capt. J. C. Kennedy. J.R.A.M., October.

The Complex Nature of Typhoid Etiology, and the *rôle* played by Animals and Men in the Spread of the Typhoid Group of Diseases. By Major J. C. B. Statham. J.R.A.M., October.

The Red Cross of Geneva. By Col. H. Hathaway and Major R. J. Blackham. J.R.A.M., October.

The Organization of Military Hospitals. By Lieut.-Col. S. Westcott. J.R.A.M., October.

A Plea for a more Detailed Study of the Soldier's Heart. By H. E. Deane. J.R.A.M., October.

Wheeled Ambulances for Mounted Troops. By Col. H. G. Hathaway. C.J., October.

The Solar Element in Sunstroke, in its Physical Relations. By Lieut.-Col. R. J. Simpson. J.R.A.M., November.

The Treatment of Gonorrhœa in the Army. By Major H. C. French. J.R.A.M., November.

The School of Army Sanitation, Aldershot. J.R.A.M., November.

Enteric Incidence in India, and its Lessons. By Lieut.-Col. G. S. Thomson. J.R.A.M., November.

The Care of Sick and Wounded in Marlborough's Campaigns. By Major H. A. Howell. J.R.A.M., November.

What is the most Effective Organization of the American National Red Cross for War and what should be its Relations to the Medical Departments of the Army and Navy? By Major H. T. Raymond, Med. Corps, U.S.A. J.A.M.S., September.

The Campaign Against Mosquitoes in German South-West Africa. By Stabsarzt Dr. H. Werner. A.F.H., Supplement 5 of 1908.

Recent Publications on the Statistics of Recruiting in Germany and other Countries. By Stabsarzt Dr. H. Schwiening. D.M.Z., 5th August.

Drummers' Paralysis and its Treatment. By Stabsarzt Dr. V. Würthenau. D.M.Z., 20th August.

The Use of Extension Splints during Transport of Wounded in Time of War. By Stabsarzt Graf. D.M.Z., 20th August.

The Use of the Officers' Gaiter as a Splint for General Use. By Stabsarzt Dr. Kaufmann. D.M.Z., 20th August.

Comparison of the Casualties in the Russo-Japanese War with those of the Franco-German War of 1870-71. D.M.Z., 5th July.

Infectious Diseases of the Intestines, and Flies. By Marine Oberstabsarzt Dr. H. Trembur. D.M.Z., 5th July.

The Treatment of Insanes during War. By Stabsarzt Stier. D.M.Z., 5th July.

Sanitation in a Territorial Camp. By Capt. J. S. Warrack, R.A.M.C. (T). L., 26th September.

The Sanitary Defence of the Hedjaz Railway. L., 26th September.

A Suggestion for Field Sanitation. By Brig.-Gen. Woodhull, U.S.A. (retired). J.M.S.I., November-December.

The Military Nurse. A Problem of Demand and Supply. By Major W. S. Terriberry, M.D. J.M.S.I., November-December.

The Barber-Surgeon and Surgeon of the Time of the Fredericks to the Close of the War of Liberation. By Generalarzt Niebergall. D.M.Z., 20th October.

Camps of Instruction and Field Medical Service. By Med. Major Thooris and M.-Aide-Major Morisson. A.M.P., November.

The Individual First Aid Packets of the Principal Armies of the World. By Major Laval. J.A.M.S., October.

The Effects of Tropical Climate on the White Race. By Capt. W. A. Wickline, U.S.A. J.A.M.S., October.

A Russian Medical Officer on Russian Army Shortcomings. Editorial. J.A.M.S., October.

Leather Splints Capable of Application by the Individual. By Dr. Evler. D.M.Z., 5th November.

Contribution to the Question of Fitness for Military Service after Appendicitis Operations. By Stabsarzt Dr. Becker. D.M.Z., 5th November.

Marks of Lebel and Spent Bullets on Targets during Collective Firing. By Med. Major Bonnette. A.M.P., October.

Report on an Experimental Journey of a Hospital Train. M.A.G., October.

The Organization of a Medical Service with Cavalry in the Field. By Stabsarzt J. Steiner. O.M.Z., October.

On Military Prison Dietaries. By Lieut.-Col. A. M. Davies. (To be continued.) J.R.A.M., December.

Experimental Investigation of "Simple Continued Fever." By Lieut.-Col. C. Birt. J.R.A.M., December.

On the Application of Heat for the Purification of Water, with Troops in the Field. By Lieut.-Col. R. Firth J.R.A.M., December.

The Micro-Organism of Dysentery. By Major R. J. Blackham. J.R.A.M., December.

Mobile Field Kitchens. By Lieut.-Col. R. Porter. J.R.A.M., December.

Surgery done in the Station Hospital, Rawal Pindi. By Capt. C. H. Turner. J.R.A.M., December.

Report on a Further Series of Blood Cultures from Seventy-four Cases of Typhoid and Paratyphoid Fever. By Major J. C. B. Statham. J.R.A.M., December.

Military Hygiene. By Lieut. Otto Prausa. O.M.Z., December.

MISCELLANEOUS.

The Turkish Army of To-day. By Capt. C. B. Norman. U.S.M., September.

Aluminium Bullets for Automatic Pistols. By Lieut.-Col. Professor Heydenreich. M.W.B., ii., No. 107, p. 2511.

The Japanese Army in 1908. (Conclusion.) By the French General Staff. R.M.E., August.

Stereoscopic Photography Applied to Reconnaissance and Rapid Surveys. By Captain F. V. Thompson. R.E.J., October.

The Servian Army. By Lieut. Seidel. M.W.B., 6th October.

The Necessity of a War Chest in this Country. By Sir Robert Giffen. J.U.S.I., October.

The Military Situation in the Balkans. By Capt. C. B. Norman. N.C., November.

The Bagdad Railway. By Edwin Pears. C.R., November.

Smokeless Powders. E., 30th October.

Sea Transport. By Brig.-Gen. J. S. Cowans. P.U.S.I., October.

Rafting Experiments. By Capt. G. R. P. Wheatley. P.U.S.I., October.

Electric Lights. By Lieut. A. Lloyd Owen. U.S.M., November.

A New Rifle. By A. L. Chevalier. U.S.M., November.

The French and German Manœuvres. By Howard Hensman. U.S.M., November.

Tsushima. By Capt. Laur, with remarks by Lieut. Baudry, French Navy. (Continued.) R.M.G., September, October.

About Machine Guns. (By authority of the Spanish War Office.) M. Art., October.

International Law and its Application in the Russo-Japanese War. By Professor Nagao Ariga. (Translated by the Belgian General Staff.) (To be continued.) B.P.B.M., 31st October.

The Use of the Ski in Foreign Armies. French General Staff. (To be continued.) R.M.E., November.

The African Natural Seat on Horseback and the German "Balance Seat." By Lieut. Erhard, South-West African Protectorate Force. M.W.B., 28th November.

The German Field Kitchen. By Col. E. Hartmann. K.T.Z., Heft 10.

Concerning the Use of Moss Litter in Military Stables. M.W.B., 8th December.

The Short-Base Range-finder and its Principles of Construction. By H. Dennis Taylor. E., 11th December.

Information and Secrecy in War. By Capt. H. T. Russell. P.R.A.I., December.

A Territorial Division in Camp. By Col. A. Keene. P.R.A.I., December.

G.S. Wagon Raft for floating F.A. Equipment. By Capt. C. H. Cox. P.R.A.I., December.

MOTORS AND MOTOR TRACTION.

The Policy of the Military Authorities with regard to Motor Transport. N.M.B., 28th September.

A New Motor Wagon, Suitable for Service in the Field. K.T.Z., No. 8, p. 382.

Military Motors in Many Lands. Translated from German in Q.M.G.'s Department, W.O. A.S.C., October.

The Hornsby Chain Tractor. By Capt. T. M. Hutchinson. A.S.C., October.

Automobilism from a Military Point of View. Experiments made by Different Powers. (Continued.) J.S.M., 1st, 15th October, 1st, 15th November.

Discussion by the Russian Artillery Committee of the Question of the Employment of Motor Traction by Fortress Artillery. A.J., October.

ORGANIZATION AND ADMINISTRATION.

Organization of the Military Engineers in France. R.E.J., September.

Supply and Transport in India. By Lieut.-Gen. Sir E. H. Collen. J.U.S.I., September.

The Army of the Netherlands East Indies. By Capt. Maroix. R.I.C., i., p. 414.

Organization of the Mounted Units of the R.E. By Col. A. G. Durnford. R.E.J., October.

The Indian Supply and Transport Corps. By Sergeant E. C. Metcalf. A.S.C., October.

Partial Mobilization of a Home Battalion. By Capt. R. Blackett. U.S.M., November.

The Lines of Communication in the Grand Army in 1806-7. French General Staff. (Continued.) R.H., September, October, November.

The Lines of Communication and Supply of Armies in the Field. By Gen. Grisot. (To be continued.) J.S.M., 1st, 15th October, 1st, 15th November.

The New Montenegrian Law of Military Service. Anonymous. O.M.Z., November.

Dutch Military Affairs. R.M.S., September, p. 743.

Scandinavian Military Affairs. R.M.S., September, p. 749.

The Army Organization of Bulgaria. By Lieut. Seidel. M.W.B., 22nd October.

The Technical Side of Machine Gun Organization. By Capt. J. H. Parker, U.S. Army. J.M.S.I., November-December.

Organization of Colonial Troops in France, Germany, Italy, Holland and England. Belgian General Staff. B.P.B.M., 31st October.

The Turkish Army. By N. Surin. V.S., November.

A Much Needed Reform in the Royal Artillery. By Major K. K. Knapp. P.R.A.I., December.

POLITICAL.

Anglo-Afghan Relations. By the author of "Afghanistan." U.S.M., August, September.

The Considerations Governing the Foreign Policy of Sweden. Q.D., vol. 26, p. 333.

Social and Political Conditions in Sweden According to German Ideas. By Professor Fahlbeck. P.J., vol. 133, p. 515.

The Dispute between Holland and Venezuela. Q.D., vol. 26, p. 407.

The National Defence Question in Denmark. I.R., Beiheft 101.

STRATEGICAL AND TACTICAL.

The Means to Ensure Co-operation in Action between the Artillery and Infantry of the Field Army. By Major C. A. Sykes and by Capt. J. H. Paine. P.R.A.I., September.

General Carl von Clausewitz on War. Translated by Miss Maguire, with notes by T. Miller Maguire. U.S.M., September, November, December.

The Development of Napoleonic Strategical and Tactical Methods, as Illustrated by the Battle of Waterloo. By Col. F. N. Maude. J.U.S.I., September.

Studies in Applied Tactics: Cavalry in Battle, 16th and 17th August, 1870. By P. Lehautcourt. J.U.S.I., September, October.

Tactical Lessons from the Russo-Japanese War. M.W.B., ii., No 108, p. 2537.

Rushing Through the Attack at Manœuvres. M.W.B., ii., No. 108, p. 2537.

Tactical Lessons from the Russo-Japanese War, Discussed from the Point of View of the German Manuals. M.W.B., 5th September.

The Defence of Coast Fortresses and Harbours in the Light of the Lessons of the Russo-Japanese War. By von Bracht. M.W.B., ii., No. 110, p. 2575.

The Defence of a Position with Reference to Night Operations. By Bt.-Col. A. W. Roper. R.E.J., October.

Reports by British Officers on the War in the Far East. By von Balck. M.W.B., ii., p. 2837.

The Employment of Large Masses of Independent Cavalry against the Flanks and Rear of a Hostile Army. K.M., p. 91.

Artillery with Infantry. By Maj.-Gen. W. du G. Gray. P.U.S.I., October.

Strategic Advance Guards, or, Manœuvres of Covering Troops. By Lieut.-Col. J. B. Dumas. (Continued.) L.S.M., 15th September, 1st, 15th October, 1st November.

Lessons in Tactics Derived from the Russo-Japanese War.—Tactical Employment of Cavalry. By Capt. Niessel. (To be continued.) L.S.M., 15th September, 1st, 15th October.

Contact Detachments in the Russo-Japanese War. (3 maps.) By Lieut.-Col. Meunier. R.M.G., September.

A Treatise on the *Rôle* of Engineers in War. By Lieut.-Col. Klein, French Engineers. (Concluded.) R.M.G., September.

The Infantry Machine Gun. Its History and Tactical Employment. By Capt. Mairetet. (To be continued.) J.S.M., 15th September, 1st October, 1st, 15th November.

Considerations Regarding the Infantry Advance within the Fire Zone. By Major Armanda Tallarigo. R.M.I., 16th September.

The Tactics of the Russian and Japanese Armies in the Manchurian War. By Lieut.-Col. Janin. (To be continued.) L.R.I., 15th September, 15th October, 15th November.

Infantry Tactics. By an Artillery Officer, with special reference to the effects of Field Artillery. By Capt. Gascouin. (Concluded.) L.R.I., 15th September.

Co-operation in Battle. By Major Movelle. (Concluded.) L.R.I., 15th September.

The Co-operation of Infantry and Artillery in Action. A.M.B., September.

Fundamental Principles and Analytical Tactics of Night Attacks. (Concluded.) By Lieut.-Col. G. Trumelet Faber, French Army. U.S.I., September.

The Employment of Machine Guns. By Capt. M. Velpry, French Artillery. R. d'A., August.

The Great French Manœuvres of 1907. (With map.) Belgian General Staff. (Conclusion.) B.P.B.M., October.

A Study of the Russo-Japanese War. By Gen. Baron W. de Heusch. (Continued.) J.S.M., 15th October, 1st, 15th November.

Suggestions and Scheme for the Duties and Organization of Mounted Scouts, for Empolyment with Infantry. By Major Bruneau. L.R.I., 15th October.

August 16th, 1870. (The Battle of Rezonville.) Five maps. By Capt. F. Canonne. (To be continued.) R.M.G., October.

Criticisms on the Battle of Rezonville. By Gen. de Jacquelot. R.M.G., October.

The Campaign in Morocco, and the Lessons of the African War. By Col. Sainte-Chapelle. (To be continued.) R.C., September, October.

Extended and Thick Firing Lines. Communicated by the Austro-Hungarian School of Musketry. O.M.Z., November.

The Importance of the Flanks. By Gen. v. Falkenhausen. V.T.H., 1908, iv., p. 531.

Tactical Studies of the Campaign of 1806, Auerstadt. French General Staff. (Continued.) R.H., October, November.

Reflections on the Work of the Russian Cavalry in May and June, 1904. (To be continued.) M.W.B., 3rd November.

To what Extent have the Conditions of Success in War been Modified since 1871? By Gen. von Blume. (French translation from German by Major Painvin.) (To be continued.) L.R.I., 15th November.

The Realities of the Battle-field. (One map.) By Major Grange. (To be continued.) L.R.I., 15th November.

The Russo-Japanese War. French General Staff. (Continued.) R.M.E., November.

The Counter-Offensive. By Capt. F. Lemoine. R.M.G., November.

August 16th, 1870. (The Battle of Rezonville.) With a map. By Capt. F. Canonne. (Continued.) R.M.G. November.

The Combined Manœuvres in Italy (August and September, 1908). By Major Defrasse. R.M.G., November.

Notes on Modern Battle. By Lieut. Jean Hedde. J.S.M., 15th November.

Modern Battle.—The Review of a Work by the Austrian Col. Csicserics von Bacsany. By Capt. Liébaut. L.S.M., 15th November.

The Fourth Arm (Engineers) in Co-operation with the other Three Arms. By Capt. R. Baignol. R. du G., November.

The Railway as a New Weapon of Offence. By Capt. Rikachev. Inj., September.

Fortress Artillery Tactics. By Karpov. V.S., November.

The Protection of the Railway by the Frontier Guard in 1904-05. By Trotski. V.S., November.

General Order relating to the Training of the Troops of the Caucasian Military District. By Gen. Count Vorontsov-Dashkov. V.S., November.

Cavalry and Machine-guns. By Lieut.-Col. von Bunting. V.R.K., November.

The Cossack *Lava*. By Raiter Fen. V.R.K., November.

Thirty Years of Russian Infantry Tactics. By von Balck. J.D.A.M., October.

TELEGRAPHS AND COMMUNICATIONS.

Support of Infantry by Artillery. By Col. H. A. Bethell. U.S.M., September.

The Improvement of Communications during the Infantry Attack: a Suggestion. By Lieut. Alastair Mackintosh. U.S.M., September.

Studies on the Use of Field Telegraphs in S. Africa. By Major E. G. Godfrey Faussett. R.E.J., September-October.

An Improved Method of Signalling. By Major A. H. D. Riach. R.E.J., September.

Technical Appliances for the Transmission of Information in the German Army. N.M.B., 28th September.

The Poulsen System of Radiotelegraphy. By Lieut. Bardeloni. R.A.G., July-August, 1908.

Means of Obtaining and Transmitting Information in Modern Armies. By Capt. Pietro Mazzei. R.A.G., September.

The Transmission Services in the British and American Armies. V.T.H., 1908, iv., p. 625.

The Work of the Communication Troops in German South-West Africa. V.T.H., 1908, iv., p. 698.

Postgraduate Lectures on Radio-Telegraphy and Radio-Telephony. E., 4th December.

The *Rôle* of the Railways in Modern Warfare. K.T.Z., Heft 10.

TRAINING AND EDUCATION.

The Physical Training of a Recruit. By Lieut.-Col. B. R. Dietz. C.J., October.

The Means to ensure Co-operation in Action between Artillery and Infantry of the Field Army. By Captain B. Atkinson, R.F.A. P.R.A.I., November.

A French Translation of the German Infantry Training Regulations. By Captain Maurice Meyer. (Continued.) L.S.M., 15th September.

The Continuation of School Instruction in the Army. By Captain de l'Harpe. (Concluded.) J.S.M., 15th September.

The Professional Education of Officers. By Captain Arzano. R.M.I., 16th September.

Organization, Training, Equipment, and Tactical Employment of Skiers in France. By Captain Rivas. L.R.I., 15th September.

The New French Regulations for Fencing and Sword Play. Editorial. L.R.I., 15th October.

Tactical Training of Machine Gun Detachments. O.M.Z., September.

The New German Field Service Regulations; A Review and Criticism. French General Staff. (To be continued.) R.M.E., October.

The Musketry Regulations of the Great European Powers. By Major Karl Wilde. O.M.Z., October, November.

The Japanese Manœuvres of 1907. O.M.Z., October.

The Training of Troops. (To be continued.) J.S.M., 1st, 15th November.

The New German Field Service Regulations; a Review and Criticism. French General Staff. (Conclusion.) R.M.E., November.

Physical Training. By Lieutenant P. Jacquot. (To be continued.) J.S.M., 15th November.

Criticisms on the Manœuvres of the 1st French Army Corps in 1[illegible] By An Old Infantry Soldier. L.S.M., 1st November.

A French Translation of the German Infantry Training Regulations. By Captain Maurice Meyer. (Conclusion.) L.S.M., 1st November.

Proposals for the Better Training of Cyclists. Cyclist Patrols for Demolition purposes. K.T.Z., Heft. 9.

TRANSPORT.

The Past and Present Vehicles of the Army Service Corps. By Captain H. G. F. Cumberlege. A.S.C., October.

The Experiences of the Russo-Japanese War as Regards Transport in the Field. By N. Elsner. I.J., November.

PART III.

BOOKS, PAMPHLETS, ETC., WHICH HAVE BEEN DISTRIBUTED TO REFERENCE LIBRARIES.

Military Report on Nyasaland.

Military Report on Somaliland, Vol. II. (Routes).

Military Report on Uganda Protectorate.

Report on the French Operations in Morocco, 1907-08.

Report on the Army Qualifying Examination, held in September, 1908.

Report on the Examination of Officers for Promotion, held in May, 1908.

Report on the Examination for Admission to the Staff College, held in August, 1908.

Papers used at Foreign Languages Examination, held in October, 1908.

The Constitutional Force.

ABBREVIATIONS.

Abbreviation.	Name of Newspaper or Periodical.		Price.	Place of Publication.
A.F.	Bulletin du Comité de l'Afrique française	M.	2 frs.	Paris.
A.F.H.	Archiv für Schiffs- und Tropen-Hygiene	½ M.	*	Leipzig.
A.H.M.	Annales d'hygiène et de médecine coloniale	M.	3 frs.	Paris.
A.J.	Artilleriskii Jurnal	M.	*	St. Petersburg.
A.M.B.	Artilleristische Monatshefte	M.	m. 2.50	Berlin.
A.M.P.	Archives de médecine et de pharmacie militaires	M.	2 frs.	Paris.
A.N.R.	Army and Navy Register	W.	15 c.	Washington.
A.Q.R.	Imperial and Asiatic Quarterly Review	Q.	2/6	Woking.
A.S.C.	Army Service Corps Quarterly	Q.	2/-	Aldershot.
A.S.M.	Allgemeine schweizerische Militärzeitung	W.	*	Basle.
B.Mag.	Blackwood's Magazine	M.	2/6	Edinburgh.
B.P.B.M.	Bulletin de la Presse et de la Bibliographie militaires. (Supplement to J.M.O.B.)	F.	*	Brussels.
B.S.C.	Bulletin international des sociétés de la croix rouge	M.	50 c.	Geneva.
C.J.	Cavalry Journal	Q.	2/6	London.
C. Mag.	Canadian Magazine	M.	25 c.	Toronto.
C.M.G.	Canadian Military Gazette	F.	10 c.	Montreal.
C.O.J.	Colonial Office Journal	Q.	1/6	London.
Con.	Der Continent	M.	m. 1.25	Berlin.
C.R.	Contemporary Review	M.	2/6	London.
D.M.S.	De militaire Spectator	M.	1 fr. 50	Haarlem.
D.M.Z.	Deutsche militärärztliche Zeitschrift	½ M.	*	Berlin.
E.	Engineering	W.	/6	London.
Ec.	Economist	W.	/8	London.
Emp. R.	Empire Review	M.	1/-	London.
E.R.	Edinburgh Review	Q.	6/-	London.
F.M.F.	Feuille militaire Fédérale	V.	40 c.	Berne.
F. Rev.	Fortnightly Review	M.	2/6	London.
I.J.	Intendanski Jurnal	M.	*	St. Petersburg.
I.M.T.	Indisch Militair Tijdschrift	M.	1 fr. 50	Batavia.
Inj.	Injeniernii Jurnal	M.	*	St. Petersburg.
I.R.	Internationale Revue (Armeen und Flotten)	M.	m. 3.25	Dresden.
J.A.M.S.	The Military Surgeon. Journal of the Assoc. of Military Surgeons	M.	35 c.	Carlisle, Penn.
J.A.S.	Journal of the African Society	Q.	6/-	London.
J.D.A.M.	Jahrbücher für die Deutsche Armee und Marine	M.	m. 2.50	Berlin.
J.M.O.B.	Journal militaire Officiel	M.	*	Brussels.
J.M.S.I.	Journal of the Military Service Institution	2 M.	50 c.	Governor's Island, N. York
J.M.S.S.	Journal of the Military Scientific Society (Russian)	Q.	1 Ro. 50kop.	St. Petersburg.
J.R.A.M.	Journal of the Royal Army Medical Corps	M.	2/-	London.
J.R.C.I.	Journal of the Royal Colonial Institute	M.	/6	London.
J.S.M.	Journal des Sciences militaires	M.	*	Paris.
J.U.S.I.	Journal of the Royal United Service Institution	M.	2/-	London.
J.U.S.I. (N.S.W.)	Journal of the United Service Institution of New South Wales	A.	*	Sydney.

W., published weekly; F., fortnightly; M., monthly; Q., quarterly; V., at irregular intervals; A., annually.
* Periodicals which can only be purchased by subscription.

ABBREVIATIONS.—contd.

Abbreviation.	Name of Newspaper or Periodical.		Price.	Place of Publication.
K.M. ...	Kavalleristische Monatshefte	M.	k. 2.	Vienna.
K.T.Z. ..	Kriegstechnische Zeitschrift	M.	m.1.50	Berlin.
L.... ...	Lancet	W.	-/7	London.
L.A.F. .	Comité de l'Asie française, Bulletin ...	M.	2.25frs	Paris.
L.B.M. ...	La Belgique militaire	W.	25 c.	Brussels.
L.R.I. ...	La Revue d'Infanterie	M.	2 frs.	Paris.
L.S.M. ...	Le Spectateur militaire	F.	2 frs.	Paris.
M.A.G. ...	Mittn. über Gegenstände des Art.- u. Genie-Wesens	M.	*	Vienna.
M. Art. ...	Memorial de Artillería	M.	*	Madrid
M.C. ...	McClure's Magazine	M.	25 c.	New York.
M.I.E. ...	Memorial de ingenieros del ejército ...	M.	*	Madrid.
M.R. ...	Marine-Rundschau	M.	m. 2.	Berlin.
M.W.B. ...	Militär-Wöchenblatt	½W.	20 pf.	Berlin.
N.C. ...	Nineteenth Century	M.	2/6	London.
N.D. ...	National Defence	M.	1/-	London.
N.I.A. ...	Nation in Arms	M.	/3	London.
N.M.B. ...	Neue Militärische Blätter	W.	60 pf.	Berlin.
N.R. ...	National Review	M.	2/6	London.
O.M.Z. ...	Streffleurs militärische Zeitschrift, zugleich Organ der militär-wissenschaftlichen Vereine	M.	*	Vienna.
P.J. ...	Preussische Jahrbücher	M.	m.2.50	Berlin.
P.R.A.I. ...	Journal of the Royal Artillery	M.	2/6	Woolwich.
P.U.S.I. ...	Journal of the United Service Institution of India	Q.	2 Rs.	Simla.
Q.D. .	Questions diplomatiques et coloniales..	F.	75 c.	Paris.
Q.R. ...	Quarterly Review...	Q.	6/-	London
R.A.G. ...	Rivista di Artiglieria e Genio	M.	*	Rome.
R.C. ...	Revue de Cavalerie	M.	*	Paris.
R. d'A. ...	Revue d'Artillerie...	M.	*	Paris.
R.D.D.M.	Revue des Deux Mondes...	½M.	3 frs.	Paris.
R du G....	Revue du Génie militaire	M.	2.50fr.	Paris.
R.E.J. ..	Royal Engineers' Journal	M.	1/6	Chatham.
R.I.C. ...	Revue Indo-Chinoise	F.	1.50frs	Hanoi.
R.I.M. ...	Revue du service de l'intendance militaire	M.	2 frs.	Paris.
R.H. ...	Revue d'Histoire	M.	2 frs.	Paris.
R.M.B. ...	Revue de l'Armée belge	2 M	*	Liège
R.M.E. ...	Revue militaire des Armées étrangères	M.	1 fr.	Paris.
R.M.G. ...	Revue militaire générale	M.	2.50 fr.	Paris.
R.M.I. ...	Rivista militare italiana	M.	2 lire	Rome.
R.M.L. ...	Revista militar	F.	200 reis.	Lisbon.
R.M.S. ...	Revue militaire suisse	M.	*	Lucerne.
R.T.C. ...	Revue des Troupes Coloniales	M.	2 frs.	Paris.
S.G.R. ...	Saint George's Review	M.	1/-	London.
S.Z.A.G. ...	Schweizerische Zeitschrift für Artillerie und Genie	M.	*	Frauenfeld.
U.S.A. ...	United States Artillery Journal... ...	2 M.	50 c.	Fort Monroe
U.S.C. ...	United States Cavalry Association Journal	Q.	50 c.	Fort Leaven- [worth
U.S.I. ...	United States Infantry Association Journal	Q.	50 c.	Washington.
U.S.M. ...	United Service Magazine (Colburn's) ...	M.	2/-	London.
V.R.K. ...	Vyestnik Russkoi Konnitsi	F.	*	St. Petersburg.
V.S. ...	Voyennii Sbornik (Military Journal) ...	M.	*	St. Petersburg
V.T.H. ...	Vierteljahrshefte für Truppenführung und Heereskunde	Q.	*	Berlin.

W., published weekly; F., fortnightly; M., monthly; Q., quarterly; V., at irregular intervals; A., annually. * Periodicals which can only be purchased by subscription.

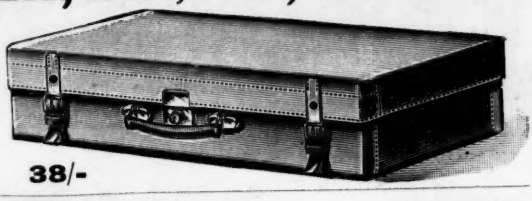
S. FISHER, LTD., 188, STRAND

"Kwikchange."

Fisher's Last New

SUIT CASE

Sole Leather.
New Principle.
Extra Light.
Extra Strong.



38/-

24 in.

With Claw Catches.

30/- to £6

FISHER'S KIT BAGS.

This Special Kit Bag,

All latest improvements. Full size, 24 in.

£5 15 0

FISHER'S "EIFFEL."

£5 to £100

This Case **£23** Silver Fittings, Ivory Brushes.

CATALOGUES FREE.

S. FISHER, Ltd., 188, STRAND, LONDON.

THE ADVERTISEMENT DEPARTMENT OF THIS JOURNAL IS CONDUCTED BY GILBERT-WOOD'S ADVERTISING OFFICES, DACRE HOUSE, ARUNDEL STREET, STRAND, LONDON, W.C., WHERE ALL COMMUNICATIONS SHOULD BE ADDRESSED.
TELEPHONE No. 4580 GERRARD.